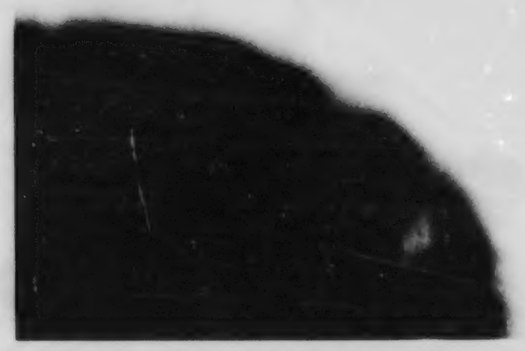
Cultivating *Change.*



The final report on projects supported by the Canada-Saskatchewan Agri-Food Innovation Fund

Achieving *Results.*

AGRI-FOOD
INNOVATION
FUND

Canada Saskatchewan

Objective

The purpose of *Cultivating Change, Achieving Results* is to provide you with a brief overview of the projects the Canada-Saskatchewan Agri-Food Innovation Fund has supported since inception. In addition, final reports for those projects that have been completed and are not confidential now are available on AFIF website www.agr.gov.sk.ca/afif. To help you obtain more detailed information about a particular project AFIF supported, we have provided the name and telephone number of the appropriate project individual for you to contact.

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A Lasting *Legacy*

by Kevin Hursh, PAg, CAC

A decade from now, will people remember the Canada-Saskatchewan Agri-Food Innovation Fund (AFIF)?

No doubt, within the agricultural research community, AFIF will still ring a bell.

While the fund gradually fades from memory, the research projects and infrastructure it has supported will live on. The program will have a lasting impact on agriculture and therefore on the entire province of Saskatchewan.

When AFIF was established in 1995, the objective was to invest $91 million in the development of emerging primary and value-added agricultural sectors in the province by providing support for research, development and infrastructure.

A further objective of the AFIF agreement was to facilitate the transition to a more market-driven economy for the Saskatchewan agri-food industry. This was to be accomplished through enhanced diversification and by encouraging Saskatchewan farmers and rural residents to create economic opportunities and jobs.

While areas of federal and provincial disagreement generally receive a lot of media attention, AFIF was a model of collaboration. Two-thirds of the funding came from the federal government and one-third from the province. Rather than separate administrations and differing mandates, the two levels of government worked together toward common goals.

The fund identified established the following strategic areas and their monetary allocation:

- Biotechnology - $19 million
- Food Processing - $13 million
- Horticulture - $3 million
- Information Technology - $2 million
- Non-food Processing - $8 million
- Specialty Crops - $13 million
- Specialty Livestock - $5 million
- Sustainable Agriculture - $8 million
- Reserved Allocations - $20 million

In all, AFIF has provided financial support to an impressive total of 282 projects. Virtually every aspect of agriculture in Saskatchewan has benefited. While projects like the Saskatchewan Food Industry Development Centre and the Fermentation Pilot Plant received millions of dollars, many individual research projects required much smaller amounts to meet their objectives.

AFIF supported specialized livestock facilities at Canadian Western Agribition, research by the University's Crop Development Centre into growing beans, as well as the research and demonstration work done by the Grazing and Pasture Technology Program, to name just a few of the fund's successes.

The facilities and the research will be a lasting legacy. Saskatchewan will have a stronger, more diversified economy as a result of the investment by AFIF.

Of course, research results are of little benefit if no one knows about them. A 16-page periodical called Innovation Report was widely distributed twice a year to highlight the progress of Agri-Food Innovation Fund projects.

A wealth of AFIF information can also be found at www.agr.gov.sk.ca/afif. The web site includes a full explanation of the program, past news releases and a listing of the projects. A contact name, telephone number and email address is provided for each project.

Most of the projects are featured in this publication, Cultivating Change, Achieving Results. However, a few projects, which are confidential in nature, cannot have their results shared with the public.

As you review this document, I am confident you'll be impressed by the many projects – large and small – that got off the ground in large part thanks to AFIF.

Clearly, AFIF has had an impact that will be felt for years to come.

Kevin Hursh is a Saskatchewan farmer
and agriculture commentator.

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Biotechnology

Canadä Saskatchewan

Project *Focus.*

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PROJECT FOCUS: Centre for Applied Biotechnology Studies

AFIF FUNDING

$3,520,000 approved. Project Status: Endowment.

OVERVIEW

AFIF provided funds for the establishment of an advanced training centre at the University of Saskatchewan to promote broadly based programs in microbial, plant and animal technology. These programs include graduate student training (M.Sc. and Ph.D levels), professional training and capacity building in molecular agriculture and applied biotech.

RESULTS ACHIEVED

Main thrusts of the project were in four areas:

- Project Management Structure;
- Space and Facilities;
- Staff Recruitment; and,
- Human Resources Training.

Recruitment of additional Masters and Doctoral students continues.

A number of innovative training and professional development programs were formulated and delivered. Course registrants came from 20 organizations across Saskatchewan and a large number of federal and provincial research facilities and private sector industries throughout Canada.

Some other programs are under development in the area of human resource training. These courses include Ag-biotech and Ethics; Market Research, Vendor Management and Selection; Economics and Logistics in converting Research & Development to Marketable Products; Intellectual Property; Management in High Tech Environments; and, The Entrepreneurial Scientist™ - a series of 18 Professional Development Courses Trade Mark Registered in Canada and the United States.

KEY CONTACT

Dr. George Khachatourians, University of Saskatchewan, (306) 966-5032.
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TECHNICAL TITLE

Centre for Human Resource Development in Molecular Agriculture and Applied Biotechnology

PROJECT FOCUS: Fermentation and Cell Culture Pilot Plant

AFIF FUNDING

$3,370,000 approved. Project completion date: 3 April 2000.

OVERVIEW

AFIF has contributed funds towards the creation of a contract fee-for-service laboratory in fermentation and cell culture technologies at the Saskatchewan Research Council (SRC) This pilot plant is available to industry and research clients.

RESULTS ACHIEVED

The Fermentation and Cell Culture Pilot Plant has been created to enable the continued growth and to improve the competitiveness of the fermentation sector of the provincial agricultural biotechnology industry. The plant's facilities and equipment are available to all companies that need to expand their research and development capabilities to speed up the development and commercialization of their products. It is also anticipated that the plant will become the centre for fermentation expertise and training in Saskatchewan.

Existing staff of fermentation companies will receive "hands-on" training on the plant's equipment during work on company's projects. Custom training programs will be developed for new staff hired to work in commercial fermentation. Short courses will be offered jointly with the University of Saskatchewan and the Alberta Research Council.

KEY CONTACT

Dr. Krystyna Sosulski, SRCI, (306) 933-8136.
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TECHNICAL TITLE

Fermentation and Cell Culture Pilot Plant

Refer to Project Number: 19960336 v.:1.2 w199

PROJECT FOCUS: Genomics-based Research for Canola Improvement

AFIF FUNDING $1,776,000 approved. Project completion date: 31 March 2002.

OVERVIEW The Project's main thrust is to accelerate the breeding of brassica (e.g. canola) crops leading to more rapid development of varieties with desirable attributes.

Agriculture and Agri-Food Canada is a partner in the Project.

RESULTS ACHIEVED The highly technical nature of this genomics-based research consists of a number of interrelated elements, some of which include:

- developing a saturation mutagenized *Brassica rapa* (Polish canola) reference population;
- genetic mapping of T-DNA insertion site and new transposon integration sites;
- maintenance of the mutagenic stocks;
- developing libraries of recipient lines; and,
- low-resolution genome mapping.

It is anticipated that this and other such research will strengthen Saskatoon as a centre for top-level plant science research and the biotechnology industry.

KEY CONTACT Dr. William Crosby, National Research Council (NRC) Plant Biotechnology Institute (PBI), (306) 975-4187.

E-mail: bill.crosby@nrc.ca

TECHNICAL TITLE A Genomics-based Program for Brassica Crop Development

Refer to Project Number: 19960415 v.:1.1 w163

PROJECT FOCUS: Partial Funding for an Ag-Biotech Research Facility

AFIF FUNDING	$1,500,000 approved. Project completion date: 1 March 2003.
OVERVIEW	AFIF is supplying funding to assist in the construction of an industry wing of the National Research Council (NRC) Plant Biotechnology Institute (PBI), a $15.4-million state-of-the-art research facility specializing in ag-biotech research. When completed, the facility will accommodate 100 new positions for researchers.
RESULTS ACHIEVED	Construction tenders for the building were issued in September 2000.
KEY CONTACT	Dr. Royal Hinther, National Research Council Plant Biotechnology Institute, (306) 975-5568. E-mail: royal.hinther@nrc.ca
TECHNICAL TITLE	Construction of an Industry Partnership Wing at the National Research Council Plant Biotechnology Institute

Refer to Project Number: 19990189 v.:1.2 w106

PROJECT FOCUS: Advanced Breeding Technologies for Canola Crops

AFIF FUNDING

$1,053,000 approved. Project completion date: 31 March 2002.

OVERVIEW

Several species related to canola contain genetic variation such as resistance to diseases, resistance to insects and improved water use efficiency that could be used to enhance the performance of new canola varieties. Genes controlling these improved characteristics are being introduced into canola using natural interspecies hybrids, advanced genetic markers and comparative genome mapping.

As part of a more long-term strategy to further improve interspecies gene transfer, a combination of molecular biology approaches is being used to clone and modify the genes that control the biochemistry DNA recombination and miss-match repair in canola.

This Project is aimed at introducing novel traits into canola varieties including improved water use efficiency, resistance to flea beetle, improved resistance to black leg disease, and improved tolerance to extreme temperatures.

Partner in the Project is Dr. Allen Good, University of Alberta.

RESULTS ACHIEVED

Research programs are well established in the new Molecular Genetics Section. Progress to date includes:

- methods being developed for modifying recombination behavior in crop plants;
- genetic mapping and Molecular Characterization of genes controlling the level of homoeologous recombination in *Brassica napus* (Argentine canola);
- transfer of genes for resistance to black leg in *Brassica. napus*; and,
- a process for transferring genes for improved water efficiency into *Brassica rapa* (Polish canola).

Some of the research is confidential.

KEY CONTACT

Dr. Derek Lydiate, Agriculture and Agri-Food Canada, (306) 956-7200.
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TECHNICAL TITLE

Advanced Breeding Technologies for Canola Crops

Refer to Project Number: 19960423 v.:1.1 w257

PROJECT FOCUS: Improving Cultivars using Biotechnology Research

AFIF FUNDING

$968,000 approved. Project completion date: 1 December 2001.

OVERVIEW

The Project is centred on developing enabling technologies for genetic transformation of wheat and barley cultivars for Saskatchewan producers. The research work includes the following components:

- development of *in vitro* regeneration protocols for commercial cultivars of wheat and barley;
- optimization of physical and biological gene delivery methods to insert genes of interest into commercial wheat and barley cultivars;
- establishment of strategies to efficiently select transformants;
- development of molecular strategies for efficient insertion of transgenes and stable inheritance in subsequent generations; and,
- development of *Agrobacterium*-mediated transformation methods for wheat and barley.

RESULTS ACHIEVED

Plant regeneration experiments for wheat and barley have been completed. More than 300 putative transgenic wheat and more than 500 putative transgenic barley have been generated. These lines are at various stages of genetic and molecular analysis. Various modifications are being made to the plant regeneration protocol to see if it can be improved.
Greenhouse evaluations have been completed and field testing is in progress.
Much of the research is proprietary and classed confidential.

KEY CONTACT

Dr. Ravindra Chibbar, National Research Council (NRC) Plant Biology Institute (PBI), (306) 975-5574.
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TECHNICAL TITLE

Development of Genetic Transformation Technology for Commercial Cultivars of Wheat and Barley

PROJECT FOCUS: Research to Produce Plant Based Vaccines

AFIF FUNDING $862,000 approved. Project completion date: 31 March 2002.

OVERVIEW This collaborative Project centres on producing animal vaccines in plants using vaccine technology developed by the Veterinary Infectious Disease Organization (VIDO) (antigen identification and animal testing) and technology developed at the University of Calgary and the National Research Council (NRC) Plant Biotechnology Institute (PBI) (gene expression in plants). Part of the research deals with designing a single step process for vaccine production in plant oil bodies.

Objectives are threefold:

- produce viral antigens in plants;
- develop methods to purify viral proteins and plant oil bodies; and,
- test vaccine efficacy.

RESULTS ACHIEVED Valuable Intellectual Property will be developed and thereby add value to industries in Saskatchewan, which has become well recognized as a world leader in novel vaccine development.

The Project's successes to date include:

- increased interest in vaccine production in Saskatchewan leading to increased R&D activity by multinationals in this province;
- control of novel vaccine technology by patents that in turn could encourage vaccine companies to locate in Saskatchewan;
- expansion of markets;
- reduced livestock losses due to improved vaccines combating diseases; and,
- establishment of an intermediate step in moving from injectable to non-injectable vaccines.

Much of the research data is proprietary and confidential.

KEY CONTACT Dr. Lorne Babiuk, VIDO, (306) 966-7575.
E-mail: babiuk@sask.usask.ca

TECHNICAL TITLE Plant Based Vaccines

PROJECT FOCUS: Improving Pulse Crops with Biotechnology Research

AFIF FUNDING

$744,000 approved. Project completion date: 31 March 2002.

OVERVIEW

The Project consists of a number of subprojects that apply biotechnology in the development of enabling technologies and will lead to improvement of the Saskatchewan pulse crop industry. More specifically the Project is aimed at genetic transformation of lentils and increased disease resistance in field peas.

Transposon mutagenesis is an effective biotechnology tool for identifying and characterizing plant genes. This system combines the ability of mutagenesis to alter plant genes with a molecular 'tagging' system that can be used to recover genes that control structural, metabolic and regulatory aspects of plant function. Because pulse crops are similar, a beneficial gene found in one species may be equally valuable when transformed into other pulse crops.

RESULTS ACHIEVED

As the Project progresses, its subgroups have yielded a number of results including:

- elite breeding lines of chickpea and lentil with durable Ascochyta resistance from two resistance genes;
- transgenic peas with economically viable levels of herbicide tolerance and fungal resistance;
- improved genetic transformation systems for the production of transgenic lentils; and,
- gathering of background information for regulatory approval of transgenic peas, including data on gene stability and outcrossing risk.

KEY CONTACT

Dr. John Mahon, National Research Council (NRC) Plant Biotechnology Institute, (306) 975-5586.

E-mail: john.mahon@nrc.ca

TECHNICAL TITLE

Biotechnology for Saskatchewan Pulse Crop Improvement

Refer to Project Number: 19960413 v.:1.1 w232

PROJECT FOCUS: Applying Biotechnology Research to Pulse Crops

AFIF FUNDING

$729,000 approved. Project completion date: 31 March 2002.

OVERVIEW

The Project is a collaborative effort involving a number of agencies and comprising a series of subprojects. Its thrust is to develop new biotechnology capabilities and apply them to the genetic improvement of Saskatchewan pulse crops. Specific goals include:

- identifying and using molecular gene markers to combine disease resistance genes for ascochyta in lentil and chickpea, and for anthracnose in lentil;
- developing a method to produce transgenic lentils;
- production of and testing of herbicide tolerance and antifungal genes in elite Crop Development Centre (CDC) pea breeding lines;
- finding new genes to turn on systemic disease resistance in peas;
- testing the stability and function of foreign genes and their effects on crop performance in transgenic peas; and,
- developing a microspore for chickpea.

Partners in the Project and subprojects include: the National Research Council (NRC) Plant Biotechnology Institute (PBI); Agriculture and Agri-Food Canada; AgrEvo Canada Inc.; and, the Plant Sciences Unit, University of Saskatchewan.

RESULTS ACHIEVED

Progress is being made on a number of fronts in areas of research, testing, data gathering and analysis.

Because biotechonology applications in pulse crops are relatively new, a communication effort is also being mounted to dispel misinformation and any confusion surrounding such genetic engineering.

KEY CONTACT

Dr. Albert Vandenberg, (CDC) - University of Saskatchewan, (306) 966-8786.
E-mail: vandenberg@sask.usask.ca

TECHNICAL TITLE

Biotechnology for Saskatchewan Pulse Crop Improvement

Refer to Project Number: 19980030

PROJECT FOCUS: Creation of a Genomics Lab for Research

AFIF FUNDING

$650,000 approved. Project completion date: 8 December 1998.

OVERVIEW

The Project Proponent was Canodev Research Inc., an incorporated subsidiary of the Saskatchewan Canola Development Commission (SCDC).

Biotechnology has great potential to increase both crop productivity and the sustainability of agricultural systems. One of the main avenues for such improvements are through genetic and transgenic modifications to crop varieties. Gene cloning and marker-assisted breeding will be central to the process. Significant technological advances have been made in recent years.

Supporting the establishment of a Molecular Genomic Unit has made technology advances available to Saskatchewan's research and development community.

RESULTS ACHIEVED

Equipment at the Molecular Genomic Unit is expected to have a long lifespan remaining state-of-the art for about five years and be in service for about 10 years.

The equipment includes an automated DNA sequencer; robotic units to process the otherwise extremely laborious process of generating and replicating gridded libraries of genomic clones; a DNA sampling workstation; -80°C chest freezers; and an automated Fast Protein Liquid Chromatography machine. This and other new equipment will allow for establishment or improvement in three key areas:

- a large-insert genomic library facility to assist in map-based gene cloning;
- a high-capacity microsatellite facility to promote marker-assisted breeding; and,
- a protein purification facility to assist in protein-based gene cloning.

KEY CONTACT

Roy Button, SCDC, (306) 975-6620.
E-mail: rbutton@scdc.sk.ca

TECHNICAL TITLE

Proposal to Support the Establishment of a Molecular Genomics Unit at AAFC Saskatoon Research Centre

Refer to Project Number: 19970189 v.:1.1 w252

PROJECT FOCUS: Upgrades for Nuclear Magnetic Resonance Systems

AFIF FUNDING $600,000 approved. Project completion date: 9 September 1998.

OVERVIEW The Project's mission was to upgrade the consoles of the Nuclear Magnetic Resonance (NMR) spectrometers at the National Research Council (NRC) of Canada's Plant Biotechnology Institute (PBI). Digital controlling systems were required to replace the older analog systems to improve spectrometers' performance levels.

Partners in the Project were Dr. Suzanne Abrams (306) 975-5333 of the NRC/PBI; and, the University of Saskatchewan (contributed $120,000).

RESULTS ACHIEVED The upgrades to the instrumentation packages dramatically improved throughput and scope of experiments at the NRC/PBI NMR Lab. Experiments that formerly took over night can now be completed in 30 minutes.

Other upgrades have resulted in:

- improved imaging studies for such things as water uptake into seeds;
- improved data processing whereby pictures can be transmitted to collaborating researchers;
- single seed analysis of oil content and quality in such varieties of canola and flax; and,
- the ability to conduct new investigations into organic composition of soils and tissues and dynamics in living systems.

KEY CONTACT Gordon Laycock, Prairie Malt Limited, (306) 948-3500.
E-mail: pml@prairiemaltltd.com

TECHNICAL TITLE Nuclear Magnetic Resonance Upgrades for Agriculture Research and Demonstration Applications

Refer to Project Number: 19970211 v.:1.1 w203

PROJECT FOCUS: Engineering Stress Tolerant Crops in Saskatchewan

AFIF FUNDING $555,000 approved. Project completion date: 30 November 2001.

OVERVIEW Yield and quality limitations in Saskatchewan field crops are often caused by environmental stresses such as frost, drought, heat or soil salinity. Due to the genetic complexity of environmental stress tolerance and the slow progress made by traditional breeding efforts, molecular transformation – genetic engineering – techniques are being conducted in the Project to enhance stress tolerance.

Four areas are being researched:

- identifying, isolating and characterizing important stress related genes;
- selecting existing genes shown to be correlated with stress tolerance;
- constructing transformation vectors with selected genes and promoters; and,
- refining and testing transformation protocols for canola, potato and flax.

RESULTS ACHIEVED More than 500 transgenic lines (2,000 plants) have been generated from canola, flax and potato. More than 120 lines have been harvested from canola and flax.

A number of proteins and their corresponding genes have been identified and correlated with increased tolerance to deadly stresses. Important stress genes have been selected and constructed into transformation vectors driven with stress sensitive promoters. Transformation of flax, potato and canola with these genes will be followed up by rigorous selection for incremental increases in stress tolerance under various stress conditions.

Field trials, data gathering and analysis are continuing.

KEY CONTACT Dr. Lawrence Gusta, University of Saskatchewan, Crop Development Centre (CDC), (306) 966-4974.

E-mail: gusta@duke.usask.ca

TECHNICAL TITLE Genetic Transformation of Canola, Potatoes and Flax to Enhance Their Tolerance to Frost, Heat and Drought.

Refer to Project Number: 19960421 v.:1.1 w251

PROJECT FOCUS: Improving SIAST's Facilities to Attract More Students

AFIF FUNDING

$526,000 approved. Project completion date: 1 June 2001.

OVERVIEW

To upgrade the Biological Sciences Technology Program in order to graduate skilled technicians that meet the biotechnology industry's needs. Agricultural biotech companies employ 80% of the graduates from the SIAST program. To date, applicant numbers have remained steady.

By improving facilities and upgrading labs and equipment, SIAST expects to attract more students to its program and to offer molecular biology training to previous graduates and technologists seeking to upgrade their skills.

RESULTS ACHIEVED

AFIF funds were used to:

- equip a molecular biology laboratory to industry standards;
- replace two plant environmental chambers;
- set up a computer lab for Internet access, aided learning packages and computer simulations;
- upgrade some lab instruments; and,
- ensure faculty members have the latest information and industry techniques.

Formal agreement has been reached with the Plant Biotechnology Institute (PBI) at the National Research Council (NRC) to train up to 10 students annually on practicum and have instructors partner with researchers to keep current on latest techniques in such areas as bioinformatics, bioethics, genomics and proteomics.

Discussions have opened with the Universities of Regina and Saskatchewan on creating the opportunity for Kelsey Campus Biotechnology Program graduates to complete a four-year degree program with two more years of university after finishing their two-year Biotechnology Diploma at SIAST.

KEY CONTACT

Dr. Joanne Post, Saskatchewan Institute of Applied Arts & Sciences – Kelsey Campus, (306) 933-6454.
E-mail: postj@siast.sk.ca

TECHNICAL TITLE

Biotechnology Human Resource Development Program

PROJECT FOCUS: Espousing the "Public Good" of Biotechnology

AFIF FUNDING	$480,000 approved. Project completion date: 27 April 2001.
OVERVIEW	The Project's emphasis was on raising public awareness to promote an understanding of the positive aspects of biotechnology through keying on the "public good" that is derived from biotechnology.
RESULTS ACHIEVED	Using a series of publications including brochures, newsletters and information fact sheets, the Project also offered an innovative hands-on demonstration laboratory program, all of which have gained a high level of credibility. The demonstration lab, known as the Saskatchewan AgBiotech Information Centre (SABIC), also offers an interactive workshop for producers, agribusiness groups and the general public. Other information campaigns included the Agricultural Biotechnology Library Series; Food/Grocery Industry Publications; and, participation in a large variety of workshops, conferences, seminars, meetings and expositions. Much of the materials produced have been sent to many schools across North America, industry stakeholders, dieticians and food writers. Responses have been favorable.
KEY CONTACT	Peter McCann, Ag-West Biotech Inc, (306) 975-1939. E-mail: peter.mccann@agwest.sk.ca
TECHNICAL TITLE	Ag-West Biotech Inc. – Public Education and Awareness Initiative

Refer to Project Number: 19960432 v.:1.2 w176

PROJECT FOCUS: Making Improvements to Canola Meal

AFIF FUNDING $447,000 approved. Project completion date: 1 August 2001.

OVERVIEW The Project was aimed at increasing the value of canola meal through the reduction of dietary fibre and phytate. Completed research is expected to contribute to the development of canola varieties that will provide processed canola meal with increased nutritional value.

The indigestible fibre content of the canola seed meal will be reduced without compromising the viability of the seed. Lignin (a stiffener in cell walls) comprises approximately 25% of the total fibre content in canola seeds. A major thrust of the Project was the reduction of lignin, which could result in a 10-15% lignin decrease.

Phytate, a compound that chelates minerals thereby causing a loss of minerals in animals and fowl, is indigestible and therefore reduces the potential value of canola seed meal by limiting the available markets for the meal. The Project is targeting a 25% reduction in phytate accumulation in canola seed that could create new markets for canola seed meal.

New markets are anticipated for lower-fibre canola in the fish farming industry and canola meal in conventional farming.

RESULTS ACHIEVED The Project has been successful in developing transgenic canola lines aimed at reducing dietary fibre. A number of new canola lines are being evaluated for total fibre levels as well as for oil and protein content in the meal.

Transgenic canola lines as well as *Arabidopsis* lines have been developed that are designed to reduce phytate levels in the plant's seeds. Testing is under way to determine the reduction in their phytate levels.

A number of large agricultural companies have been contacted with a view to fostering further development of these technologies in commercial crops.

KEY CONTACT James MacPherson, Performance Plants Inc., (306) 668-7708.
E-mail: macpherson@performanceplants.com

TECHNICAL TITLE Improvement of Canola Meal through Reduction of Lignin and Phytate Biosynthesis

Refer to Project Number: 19960403 v.:1.2 w311

PROJECT FOCUS: Genetic Modification of Flaxseed Oil

AFIF FUNDING

$429,000 approved. Project completion date: 15 January 2002.

OVERVIEW

In Western Canada, flax has traditionally been grown as an industrial oilseed crop. The value of flaxseed oil as an industrial input (such as linseed oil used as an industrial drying oil), is dependent on the high linolenic acid content (55-60%) of this oil.

Because international markets (dominated by other oilseeds) set the price of flaxseed oil, a flax cultivar with higher oil content would increase the value to farmers without increasing their input costs. Similarly, the modified oil profile with increased linolenic acid content would be of interest to the industry. Yet another benefit could be other alterations to the oil profile possibly leading to access to a different industrial or other specialty market.

This Project is researching genetically modified flax seed oil composition and content. Successes in the research will carry significant impacts to Saskatchewan, including, but not limited to: Increased economic value through increased demand; Increased production areas and crop rotations offering more options for growers; Intellectual Property derivatives for the NRC's Plant Biology Institute and the University of Saskatchewan's Crop Development Centre; Training programs in biotechnology for highly skilled personnel will upgrade the workforce.

RESULTS ACHIEVED

- Two genes, known to increase oil content and linolenic acid level, have been transferred to flax;
- A large number of transgenic flax lines expressing these lipid genes were produced and candidate lines showing increased linolenic acid content and seed oil content have been selected for further development;
- The most promising of the transgenic lines have been crossed with each other to produce individuals with both desirable traits;
- Selected lines are being evaluated in field trials.

KEY CONTACT

Dr. Alan McHughen, University of Saskatchewan, (306) 966-4975.
E-mail: mchughen@usask.ca

TECHNICAL TITLE

Genetic Modification of Flax Seed Oil

Refer to Project Number: 19960422 v.:1.2 w307

PROJECT FOCUS: Genetic Engineering of Disease Resistant Potatoes

AFIF FUNDING

$380,000 approved. Project completion date: 1 March 2002.

OVERVIEW

The cornerstone of the North American commercial potato industry is the availability of reasonably priced, high quality seed. Saskatchewan has developed a reputation for production of seed potatoes of unparalleled quality, resulting in a doubling of the acres in seed production in a four-year period.

While this Northern growing environment is conducive to fewer diseases, many still represent challenges to the industry.

Viral diseases such as Potato Leaf Roll (PLRV) and Potato Viruses X, Y and S are serious threats to the seed and commercial potato industries. These diseases are spread by insects and by planting infected seed.

Potato foliage and tubers are also attacked by a range of fungal pathogens, both in-field and during storage. Rising costs of fungicides and pesticides, coupled with toxicity concerns in the environment and to consumers, have led the industry to seek alternative control strategies.

The Project's emphasis is on developing commercial potato cultivars with high levels of disease resistance.

Agriculture and Agri-Food Canada is a partner in the Project.

RESULTS ACHIEVED

Gene transfer technology has been used to render several of the most commercially important potato varieties resistant to PLRV and Potato Mosaic virus. Resistance to genes for Verticillium wilt has been transferred from tomato into potato – resulting in a high degree of disease resistance. Genes that enhance crop tolerance to a range of fungal diseases have been isolated and are being evaluated in field trials.

Potato lines resistant to targeted diseases will have strong market potential. Release of disease-resistant transgenic lines will allow production of potatoes with less reliance on pesticides now required to control insects spreading diseases.

KEY CONTACT

Dr. Doug Waterer, University of Saskatchewan, Department of Horticulture Science, (306) 966-5860.

E-mail: waterer@sask.usask.ca

TECHNICAL TITLE

Genetic Engineering of Potatoes for Disease Resistance

PROJECT FOCUS: Enhancing DNA Sequencing Research at NRC-PBI

AFIF FUNDING

$333,000 approved. Project completion date: 19 May 1999.

OVERVIEW

The ability to sequence DNA is essential to the agriculture biotechnology industry. It enables researchers to decipher the genetic code that is necessary for the localization, identification and characterization of genes in the plant genome. Sequence information offers new and rapid approaches to the identification of new proteins having important applications in ag-biotech. Sequence information is essential for the development of DNA-based markers used in plant breeding, cultivar identification and identification of plant pathogens.

The Project was based on the purchase of new equipment to enhance the ability of the DNA Technology Unit at the National Research Council's (NRC) Plant Biotechnology Institute (PBI) to provide DNA sequencing, analysis and synthesis services in support of the ag-biotech industry.

RESULTS ACHIEVED

Purchase of the DNA Sequencer, the DNA Synthesis Unit and the assorted hardware and software needed in the package has brought increased interest in research and development activities from various ag-biotech organizations. The fee-for-service DNA Technology Unit is expanding its national and international client base as well as providing support for collaborative research projects.

This new infrastructure resource has enhanced Saskatoon's ability to attract new biotech companies interesting in using the DNA sequencing and synthesis service facility.

KEY CONTACT

Dr. Lawrence Pelcher, NRC-PBI, (306) 975-5967.
E-mail: larry.pelcher@nrc.ca

TECHNICAL TITLE

Enhancement of the DNA Sequencing and Synthesis Capacity of the DNA Technology Unit

PROJECT FOCUS: Building a Diagnostic Lab for the Livestock Industry

AFIF FUNDING	$319,000 approved. Project completion date: 6 October 1999.
OVERVIEW	The Project was aimed at setting up a polymerase chain reaction (PCR) laboratory to serve the animal diagnosis needs of the Saskatchewan livestock industry at the Western College of Veterinary Medicine (WCVM). PCR is a powerful new biotechnology that detects traces of genetic material from infectious organisms. Advantages of PCR as a diagnostic tool are rapidity, high sensitivity and cost effectiveness. Partners in the Project were Dr. M. Chirino-Trejo, Dr. J. Ellis, Dr. M.L. Jackson, Dr. E.G. Clark, Dr. D.M. Haines and Dr. J.P Orr.
RESULTS ACHIEVED	Laboratory standards agencies recognize that the exceedingly high sensitivity of PCR diagnostic techniques necessitate special laboratory design. Three laboratory spaces within the Department of Veterinary Pathology and Veterinary Microbiology at the WCVM were renovated and equipped for performing molecular biological procedures, specifically PCR. (A minimum of three dedicated rooms encompassing four workstations is required as a precaution against contamination). This new state-of-the-art facility is being fully utilized in livestock disease diagnosis as well as training of veterinarians and livestock industry stakeholders. Diagnostic services are currently being performed in the lab alongside test development research. Priorities for test development are set with input from the veterinary profession, the livestock industry and the veterinary diagnostic laboratories of the province.
KEY CONTACT	Dr. Greg Appleyard, WCVM (306) 966-7213. E-mail: greg.appleyard@usask.ca
TECHNICAL TITLE	Establishment of a PCR Laboratory for the Diagnosis of Infectious Diseases at the WCVM

Refer to Project Number: 19960400 v.:1.1 w251

PROJECT FOCUS: Enhancing a Mass Spectrometry Lab's Services

AFIF FUNDING $250,000 approved. Project completion date: 31 March 2001.

OVERVIEW

Within the last five to 10 years the science of mass spectrometry has advanced at a phenomenal pace so that it is now possible to analyze very large molecules including proteins. Mass spectrometry works on the principle that ions generated from molecules in the gas phase can be separated based on their behavior in a magnetic field, an electrostatic field, or time-of-flight analyzer. Separation and detection of these ions gives information on the molecular weight and structure of the molecules.

Creation of the Centre for Macromolecular Structure Analysis is under way to provide Saskatchewan industries and their research partners with state-of-the-art mass spectrometry and other analytical services. It is located in the National Research Council (NRC) Plant Biotechnology Institute (PBI) in Saskatoon.

RESULTS ACHIEVED

Purchase of a mass spectrometer for molecular weight and structural analysis of proteins, peptides and other biopolymers, enables the Centre to deliver comprehensive analysis of macromolecules. This scientific instrument's computer hardware and software control operating parameters and assist in data interpretation. The spectrometer is also compatible with liquid chromatography for the on-line separation of complex mixtures.

Clients can access the Centre's services through the Mass Spectrometry Lab's fee-for-service contracting. Client numbers will also act as a measure of the Project's success.

KEY CONTACT

Dr. Suzanne Abrams, NRC-PBI, (306) 975-5333.
E-mail: sue.abrams@nrc.ca

TECHNICAL TITLE Centre for Macromolecule Structural Analysis Mass Spectrometer

PROJECT FOCUS: Understanding the Obese Gene in Cattle

AFIF FUNDING

$200,000 approved. Project completion date: 30 September 2001.

OVERVIEW

The Project centres on the study of the obese (*ob*) gene and its role in regulating fat deposits and appetite in cattle. The research will aid the development of mechanisms and strategies to improve beef cattle production performance and carcass quality.

The *ob* gene was discovered in the last decade. It encodes a protein hormone called leptin that is secreted only by adipose (fat-containing connective) tissue. Evidence indicates leptin regulates total body fat content by suppressing appetite and modifying nutrient partitioning. Interestingly, in humans, obesity is correlated with high circulating leptin levels indicating a failure of leptin to appropriately interact with its receptor located in the hypothalamus of the brain.

RESULTS ACHIEVED

Methods for measurement of leptin concentrations in serum of cattle are being developed. Critical to this phase of the study is the development of a bovine leptin assay.

Serum leptins levels are being measured from weaning to slaughter with increased blood sampling occurring during the animals' finishing stage. Comparisons are being made between heifers and steers as well as animals genetically determined to carry the "fat" or "lean" gene characteristics.

A significant benefit of the research will be improved knowledge of the physiological mechanisms governing fat deposition in cattle. To date, the *ob* gene product, leptin, has been virtually unstudied in cattle even though it has a dramatic influence on appetite and fat levels in mice and humans.

KEY CONTACT

Dr. Fiona Buchanan, University of Saskatchewan, (306) 966-4160.
E-mail: fiona.buchanan@usask.ca

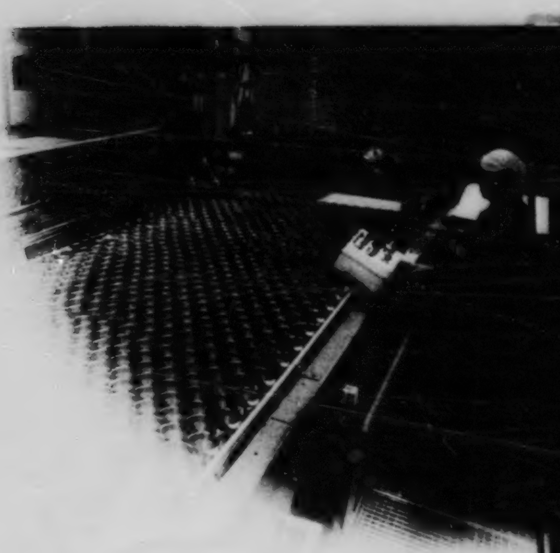
TECHNICAL TITLE

Molecular Genetic Techniques for Selection of Production Traits in Cattle Obese gene (regulation of appetite and fat disposition in cattle)

Food *Processing*

AGRI-FOOD INNOVATION FUND

Canadä Saskatchewan



Project *Focus.*

29 Food Centre Offers Industry Research Integration

30 Positioning a Food Scientist at the Food Centre

31 Business Skills Help for Small Agri-businesses

32 Setting Up the Saskatchewan Nutraceutical Network

33 Upgrading and Expanding Food Centre Facilities

34 Delivering Quality Assurance Programs

35 Strengthening Food Industry Strategic Alliances

36 Saskatchewan Bounty: Celebrating Goodness

PROJECT FOCUS: Food Centre Offers Industry Research Integration

AFIF FUNDING

$8,500,000 approved. Project Status: Endowment.

OVERVIEW

The Project's thrust is to expand high quality coordination, liaison, marketing, extension, technical, trouble-shooting, equipment and service assistance to the food processing industry in Saskatchewan through integration and coordination of current and planned activities of the member institutions

Partners in the Project include Saskatchewan Agriculture and Food; the University of Saskatchewan; and, the Saskatchewan Food Processors Association (SFPA).

RESULTS ACHIEVED

Establishment of the Food Centre has expanded food processors' access to the technical expertise needed to develop, test and produce their products. It has created a critical mass of skilled processors within the industry.

The Centre operates as a not-for-profit and not-for-loss organization. It provides a "one-stop-shop window" to those in the food industry seeking assistance and/or guidance.

The Centre also advocates the co-location of adjunct organizations and facilities sharing the overhead costs of the facility.

The Food Centre aims to increase economic activity in the food processing industry and promote an industry shift from commodity-based agri-production to value-added agri-food manufacturing.

KEY CONTACT

Dan Prefontaine, University of Saskatchewan, Saskatchewan Food Industry Development Centre, (306) 966-8831.

E-mail: dprefontaine@foodcentre.sk.ca

TECHNICAL TITLE

(Endowment) Saskatchewan Food Industry Development Centre

PROJECT FOCUS: Positioning a Food Scientist at the Food Centre

AFIF FUNDING

$2,000,000 approved. Project Status: Endowment.

OVERVIEW

AFIF provided long-term funding for the provision of a food scientist who would provide services designed to fill gaps with product development.

Objectives for the endowment included:

- enhancing access by food processors to the technical expertise required to develop, test and produce their products to comply with regulations pertinent to their products, and, to create a critical mass of skilled processors within the industry; and,
- strengthening food-processing companies by providing awareness for the need to improve business skills, providing trained students and encouraging strategic alliances.

RESULTS ACHIEVED

The Food Scientist's duties and responsibilities include:

- acting as the Food Centre's principal technical contact and technical service/technical extension provider;
- under the direction of the President, being responsible for all technical services provided by the Centre and lead its in-house research and development programs;
- assisting food processors in accessing services, equipment or expertise at other institutions;
- providing the technical component of Centre initiatives related to human resource development and marketing;
- participating in teaching, graduate student supervision and committee work within the Department of Applied Microbiology and Food Science; and,
- interacting with other researchers.

KEY CONTACT

Robert Tyler, University of Saskatchewan, (306) 966-5024.
E-mail: bob.tyler@usask.ca

TECHNICAL TITLE

(Endowment) Food Scientist

Refer to Project Number: 19970166 v.:1.1 w222

PROJECT FOCUS: Business Skills Help for Small Agri-businesses

AFIF FUNDING

$1,411,000 approved. Project completion date: 31 March 2003.

OVERVIEW

While many smaller agricultural-related businesses in Saskatchewan pay much attention to capital costs and operating budgets, emphasis on business processes and development can be more limited or lacking.

This human resource development program is designed to provide business skills improvement programs to clients in small to medium sized businesses in the food processing, agricultural non-food processing and horticultural industries.

Partners in the Project include the Food Centre, Saskatchewan Food Processors Association and Saskatchewan Agriculture and Food. There has also been some involvement from other government programs such as Western Diversification and private sector consultants/experts in working with clients.

Through an assessment of the company business skills, consultants will work with clients to help them gain a better understanding of their current skills set, as well as set priorities on how their skills can be improved.

RESULTS ACHIEVED

Since its inception in January 2000, this three-year program has been establishing itself through awareness campaigns to potential clients. The program is divided into an Assessment Phase and a (later) Skills Development Phase. Work has begun with a number of eligible clients in areas of improving marketing, financing, human resources management and computer skills.

KEY CONTACT

Marlin Stangland, Marmax Business Consultants, Saskatoon, (306) 933-8405.
E-mail: mstangland@foodcentre.sk.ca

TECHNICAL TITLE

AFIF-Human Resources Development Program

PROJECT FOCUS: Setting Up the Saskatchewan Nutraceutical Network

AFIF FUNDING

$1,000,000 approved. Project completion date: 1 February 2002.

OVERVIEW

The Project is mandated to develop a strong Saskatchewan nutraceutical and functional food (such as herbal and health food) industry to promote private investment in Saskatchewan companies as well as encourage research activities.

A major component of the undertaking involves gathering and disseminating relevant research and market intelligence to a Saskatchewan Nutraceutical Network (SNN).

Partners in the Project are: Saskatchewan Agriculture and Food; Agriculture and Agri-Food Canada; Crown Investments Corporation of Saskatchewan; Western Economic Diversification; National Research Council of Canada; Saskatchewan Economic and Co-operative Development; Saskatchewan Opportunities Corporation; Saskatoon Regional Economic Development Authority; and, the Canada-Saskatchewan Agri-Food Innovation Fund.

RESULTS ACHIEVED

Current membership in the SNN continues to grow and exceeds 130 organizations from across Canada, the U.S. and Europe. It includes companies, trade and service organizations, research and development facilities and government agencies.

A number of initiatives that have been completed, or are in progress, include:

- assistance in New Company startup and development of Business Plans;
- strategic Planning Advice and Industry Contacts;
- promotion and support for investment opportunities in Saskatchewan companies to government funding agencies and venture capitalists;
- assistance in Research and Development funding and networking;
- product Development and Promotional support;
- regulatory and Advocacy support;
- information sharing through Member packages, conferences, seminars, newsletters, and a web site www.nutranet.org ,and,
- increased domestic and international contact in nutraceutical and functional food development, production, processing and manufacturing.

KEY CONTACT

Ms. Kelley Fitzpatrick, Saskatchewan Nutraceutical Network, (306) 652-2783.
E-mail: kfitzpatrick@nutranet.ca

TECHNICAL TITLE

Saskatchewan Nutraceutical Network

Refer to Project Number: 19970161 v.:1.2 w269

PROJECT FOCUS: Upgrading and Expanding Food Centre Facilities

AFIF FUNDING	$1,000,000 approved. Project completion date: 6 June 2001.
OVERVIEW	Upgrading the existing facility, including the addition of a new lab will provide the food processing industry with access to product development expertise, scale up production equipment and provide a facility for manufacturers to test their products. Partners in the Project include Saskatchewan Agriculture and Food, the University of Saskatchewan and the Saskatchewan Food Processors Association.
RESULTS ACHIEVED	A portion of the funding was put toward some equipment in the Commercial Kitchen. Remainder of the funds was set for the completion of the federally-inspected process facility and equipment that opened in the first quarter of 2001. The new facility can accommodate larger processors, especially in the meat industry. It now boasts a 900 square metre (10,000 square foot) federally-inspected interim processing facility that will allow the manufacturing of Saskatchewan made food products for test marketing worldwide.
KEY CONTACT	Dan Prefontaine, Saskatchewan Food Industry Development Centre, (306) 966-8831. E-mail: dprefontaine@foodctnre.sk.ca
TECHNICAL TITLE	Saskatchewan Food Industry Development Centre (SFIDC) – Upgrading the Existing Building and Construction of Analytical Support Lab and Pilot Facility for Food Processors

Refer to Project Number: 19970181 v.:1.1 w192

PROJECT FOCUS: Delivering Quality Assurance Programs

AFIF FUNDING

$750,000 approved. Project completion date: 31 March 2002.

OVERVIEW

Saskatchewan Agriculture and Food (SAF) is administering this umbrella program that focuses on delivery of national on-farm safety programs in the province, and food safety programs for provincially inspected meat processors.

The on-farm funding assists provincial commodity associations with awareness, producer education and pilot projects that help build delivery of national programs.

The courses will provide these smaller operations with the knowledge and skills training required for developing and implementing a process control based food safety system that meets the intent of the proposed *National Meat and Poultry Regulations and Code*.

RESULTS ACHIEVED

The course is designed in modules covering pre-classroom, classroom, post-classroom and distance education training. Overall Project objectives include assisting in:

- general awareness, promotion and education efforts for the program;
- training persons to deliver programs and/or educate primary producers;
- development of tools to enhance producer acceptability of on-farm food safety programs;
- training for small meat processors in meat inspection techniques, disease identification, and in the basics of the Hazard Analysis Critical Control Points (HACCP) techniques;
- development of communication strategies to enhance producer uptake; and,
- enhancing acceptability with processors and consumer groups and market access for Canadian commodities.

KEY CONTACT

Donn Farrer, Saskatchewan Agriculture and Food, (306) 787-6423.
E-mail: dfarrer@agr.gov.sk.ca

TECHNICAL TITLE

On-Farm Quality Assurance Program

Refer to Project Number: 19970160 v.:1.2 w230

PROJECT FOCUS: Strengthening Food Industry Strategic Alliances

AFIF FUNDING $200,000 approved. Project completion date: 1 April 2002.

OVERVIEW Key objectives of this program to strengthen individual food processing companies and the sector as a whole include:

- increasing the awareness of the need for business and market planning skills;
- increasing the pool of graduates with skills required by the industry through internship programs;
- enhancing more access to investment and financing funds; and,
- facilitating strategic alliances to increase competitiveness and access to markets.

Partners in the Project include various Saskatchewan food processing companies, Saskatchewan Agriculture and Food and several service providers to the industry.

RESULTS ACHIEVED Alliances are being actively promoted between food processors in a variety of areas including:

- custom processing, shipping and distribution, ingredient sourcing, packaging, marketing and promotion.
- a Joint Purchasing Program has been initiated and promoted whereby food processors are able to buy in bulk from a single supplier;
- an industry survey has been completed and the information collected has been put into a database. Information gathered includes distribution, shortages and excesses of ingredients, packaging, equipment, storage, and services;
- alliance/investment opportunity identification – In co-operation with SAF, this concept in being developed to identify out-of-province alliance/investment opportunities for Saskatchewan companies; and,
- information/fact sheet distribution – a series of topics have been addressed such as Packaging and Shipping, Labeling, Food Testing and Finance.

KEY CONTACT Luanne Lashyn, Saskatchewan Food Processors Association, (306) 683-2410, E-mail: lashyn@sfpa.sk.ca

TECHNICAL TITLE Strategic Alliances in the Food Industry

Refer to Project Number: 19970167 v.:1.1 w251

PROJECT FOCUS: Saskatchewan Bounty: Celebrating Goodness

AFIF FUNDING

$130,000 approved. Project completion date: 31 March 2002.

OVERVIEW

The Project's thrust is to form an association of Saskatchewan commodity groups for joint promotion of primary agricultural products such as flax, beef, lamb, turkey, herbs, specialty livestock, canola, pulse, etc.

The association plans to celebrate the goodness of Saskatchewan commodities through food related promotions while also keying on food safety issues, pesticide use and production management.

Managing Partners in the Project include: The Canola Information Service; Saskatchewan Flax Board Commission; Saskatchewan Turkey Marketing Board; and, the Beef Information Centre.

RESULTS ACHIEVED

A membership drive is under way and meetings are taking place with like-minded organizations and producer groups.

The group has successfully mounted a series of promotional activities including: a Gala dinner that highlighted local chefs in competition to prepare a meal using Saskatchewan ingredients; a monthly article, titled "By Word of Mouth", published in Regina and Saskatoon newspapers; and, the development of eight recipe sheets themed to Prairie fare.

Using various communication mediums, agricultural issues are being addressed in areas such as production practices, economic impacts, biotechnology and environmental impact.

Newsletters, cooking demonstrations, website information and brochures are being positively received by consumers. Eye catching, glossy color recipe brochures have also been popular in promoting awareness of Saskatchewan commodity products.

KEY CONTACT

Dorothy Long, Saskatchewan Bounty, (306) 378-6338.
E-mail: info@saskbounty.com Web site: www.saskbounty.com

TECHNICAL TITLE

Saskatchewan Bounty – Formation and activities Related to Development of an Association of Saskatchewan Commodity Groups

Refer to Project Number: 19980375 v.:1.2 w249

AGRI-FOOD
INNOVATION
FUND

Canada Saskatchewan

Horticulture

Project *Focus.*

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40 Upgrading and Expending the Crop Protection Lab
41 Employing a Horticulture Research Pathologist
42 Employment of a Horticulture Specialist
43 Employment of a Horticulture Vegetable Specialist
44 Employing a Greenhouse Diagnostician
45 Research to Improve Potato Crop Performance
46 Market Development Research Study: Seed Potatoes
47 Growing Processing Potatoes in Saskatchewan
48 Employing an Industry Development Officer
49 Tools for QA in the Herb, Fruit and Vegetable Sectors
50 Marketing Strawberry Crowns and Garlic to the U.S.
51 Improving Potato Yields Through Crop Rotations
52 Improving Vegetable Production Techniques
53 Developing and Evaluating Cultivation Techniques for Fruit Varieties
54 Improving Production and Quality in Berry Crops
55 Field Trials for Controlling Chokecherry Pests
56 Studying High Tunnels Options for Vegetable Crops

continued...

57 Becoming More Competitive in the Nursery Trade
58 Controlling Weeds in Bush Fruit Orchards
59 Washing Berries to Improve Quality and Shelf Life
60 Improving Christmas Tree Growth
61 Disease Forecasting and Prevention in Potatoes
62 Improving Aquaculture Research in Saskatchewan
63 Identifying Winter-Hardy Perennials in Field Trials
64 Retrofitting a Greenhouse to Improve Production
65 Expanding Northern Vegetable Production
66 Increasing Market Share for the Fruit Industry
67 Using Sea Buckthorn Berry in Nutraceutical Products
68 Reducing Potato Bruising with Technology

PROJECT FOCUS: Better Handling and Storage Facilities for Potatoes

AFIF FUNDING

$685,000 approved. Project completion date: 9 November 1999.

OVERVIEW

The Project involved construction of a potato/vegetable handling, storage and processing facility at the Canada-Saskatchewan Irrigation Development Centre (CSIDC) in Outlook, Sask.

A secondary component of the Project was an upgrading and minor expansion to the potato and storage handling facilities for the University of Saskatchewan's Potato Research Program.

RESULTS ACHIEVED

The potato industry in Saskatchewan is expanding rapidly. The CSIDC and University of Saskatchewan Plant Sciences Department conduct research and development activities to develop cost effective agronomic, storage and handling for various market classes of potatoes.

Approximately $575,000 was allotted to the Outlook Project, with about $110,000 going to the university Project. (The university supplied approximately $35,000 in additional funding for the latter project).
Both completed facilities have exceeded goals set in the original proposals.
Researchers at both centres are now able to store and handle large volumes of potatoes and vegetables from research and demonstration plots under proper storage conditions.
These facilities also allow researchers to undertake potato grading and quality analysis efficiently and conveniently developing reliable information from clients.

KEY CONTACT

John Konst, Saskatchewan Seed Potato Growers Association (SSPGA),
(306) 867-8939.
E-mail: sspga@sk.sympatico.ca

TECHNICAL TITLE

Construct Potato/Vegetable Handling Storage and Processing Facility at CSIDC

PROJECT FOCUS: Upgrading and Expending the Crop Protection Lab

AFIF FUNDING

$580,000 approved. Project completion date: 22 June 2000.

OVERVIEW

The Project centred on an upgrade to current facilities to achieve federal testing accreditation for ring rot and other diseases. The upgrade has improved crop protection services for Saskatchewan farmers and related industries, as well as promoting the lab as a leading diagnostic facility in Western Canada.

Partners in the Project were Saskatchewan Agriculture and Food and the Saskatchewan Property Management Corporation (SPMC).

RESULTS ACHIEVED

The new facility was located and leased to accommodate testing programs that increased the operations size to 480 square metres from 132 square metres. New equipment was purchased including two growth chambers, a large walk-in cooler, water treatment systems and a forklift.

The Crop Protection Laboratory has the capacity to:

- handle insect, weed and plant disease specimens in a more efficient and expedient manner in support of the Saskatchewan Agri-food industry;
- provide a wider range of weed resistance to herbicide screening; and,
- provide services related to the diseases and pests of potatoes including required accreditation for bacterial ring rot testing if needed.

KEY CONTACT

Grant Holzgang, Saskatchewan Agriculture and Food (SAF), (306) 787-8130.
E-mail: GHolzgang@agr.gov.sk.ca

TECHNICAL TITLE

Provincial Crop Protection Laboratory

Refer to Project Number: 19970208 v.:1.2 w209

PROJECT FOCUS: Employing a Horticulture Research Pathologist

AFIF FUNDING $392,000 approved. Project completion date: 31 December 2001.

OVERVIEW The Saskatchewan Seed Potato Growers Association and the Saskatchewan Fruit Growers Association partnered in the project. A research pathologist was funded to conduct research and support relating to plant disease identification, prevention and management in support of the province's potato and fruit industries.

RESULTS ACHIEVED Research was conducted on a range of potato diseases including potato scab, blight, silver scurf, black scurf, dry rot and soft rot. Field trials were conducted to evaluate management options for these diseases.

A number of industry-related reports were generated (1998-2000) including:

- a survey of storage diseases in seed and commercial potato storages;
- an evaluation of fungicide resistance in storage diseases of potatoes;
- development of diagnostic tools for identification of powdery scab infections in seed and soil;
- evaluation of chemical control products for leaf and berry spot of saskatoons; and,
- supporting data for registration of new disease control products in both potatoes and saskatoons.

The principal scientist on the project has presented her findings at numerous grower and academic meetings. She has also consulted extensively with the industry to improve its understanding of diseases identified in Saskatchewan.

KEY CONTACT Dr. Doug Waterer, University of Saskatchewan, (306) 966-5860.
E-mail: waterer@sask.usask.ca

TECHNICAL TITLE Horticulture Research Pathologist

PROJECT FOCUS: Employment of a Horticulture Specialist

AFIF FUNDING $358,000 approved. Project completion date: 31 March 2002.

OVERVIEW To conduct applied research and provide extension services on post-harvest needs of horticulture crops.

The project was separated into two sectors. A Fruit Sector keyed on optimal post-harvest handling and storage operations for marketing fresh saskatoon berries.

A Vegetable Sector centred on monitoring changes in harvested potato quality (skin color, texture, etc.) during storage. Also studied was the extent of browning in cabbage cultivars during coleslaw processing.

Partners in the project were Wendy Pomedli (Research Technician), Drs. Richard St. Pierre and Doug Waterer (Supervisors).

RESULTS ACHIEVED Fresh saskatoon berries can be stored under modified atmosphere conditions (5% CO_2, 2% O_2) for at least four weeks with minimal loss to fruit quality. Microbial contamination and wilting, due to moisture loss, were not apparent during storage under these conditions. These results are considered "crucial" to establishing a fresh market industry for saskatoon fruit. Members of the industry are currently marketing fresh saskatoon fruit using this modified atmosphere technology.

Quality indicators of clones of Norland potatoes remained relatively unchanged during storage. These results are highly significant to the potato industry in that changes in skin color (from bright red to pinkish-brown) occur during the distribution chain and not during storage.

Cabbage cultivars grown in Saskatoon, Sk. and Outlook, Sk., were found to be less susceptible to browning (in terms of coleslaw processing) than those grown in Nipawin. Regardless of the growing site, the study results consistently found the Lennox variety is the most susceptible cultivar to browning during coleslaw processing compared with such varieties as Cecile, Almanac and Vantage Point.

A number quality issues were measured in terms of handling and storage for fruits and vegetables.

KEY CONTACT Dr. Richard St. Pierre, University of Saskatchewan, (306) 966-5867.
E-mail: stpierre@sask.usask.ca

TECHNICAL TITLE Horticulture Post Harvest Specialist

PROJECT FOCUS: Employment of a Horticulture Vegetable Specialist

AFIF FUNDING

$273,000 approved. Project completion date: 31 March 2002.

OVERVIEW

To provide production technologies for vegetables, with a main focus on disease control and extension services for the potato sector.

Partners in the project included the Saskatchewan Seed Potato Growers Association and the Saskatchewan Vegetable Growers Association.

RESULTS ACHIEVED

The Specialist worked with the industry to set up disease control programs for seed and commercial potatoes. As well as sample gathering and industry presentations, the Specialist also worked with monitoring systems for Late Blight in potatoes and aphid identification for Saskatchewan seed potato growers.

The Specialist handled both telephone and field calls, attended seminars, meetings and workshops. Technical information was also provided to the vegetable industry.

Due to expanding markets, a 19% acreage increase in seed potato production was noted in one growing year. Larger grower turnouts and participation at field days and conferences for vegetables and potatoes were attributed to increased awareness programs undertaken by the Specialist.

The Specialist also authored a number of articles for various vegetable industry publications. Production information was also gathered and distributed.

KEY CONTACT

John Buchan, Saskatchewan Agriculture and Food, (306) 787-4661.
E-mail: JBuchan@agr.gov.sk.ca

TECHNICAL TITLE

Horticulture Vegetable Specialist

Refer to Project Number: 19970173 v.:1.3 w204

PROJECT FOCUS: Employing a Greenhouse Diagnostician

AFIF FUNDING $272,000 approved. Project completion date: 31 March 2002.

OVERVIEW To provide diagnostic and extension services for the greenhouse and nursery sectors.

RESULTS ACHIEVED Awareness of chemical regulations and safety measures were increased via five workshops and, to date, more than 50 growers have been certified as licensed applicators.

There has been intensive use of the diagnostician's expertise through distribution of information packages, presentations, writing articles for newsletters, field calls, fact sheets, office walk-ins, e-mails and telephone calls. Diagnostic services have been provided to the bedding plant, vegetable and herb industries.

The diagnostician produced a 30-page publication "Greenhouse Vegetable Production in Saskatchewan – Production and Economic Information" in conjunction with the Economics and Farm Management Section of Saskatchewan Agriculture and Food.

Industry has shown support for the position through meetings with government officials and financial contributions to assist in attending external tradeshows, conference and workshops.

KEY CONTACT John Buchan, Saskatchewan Agriculture and Food, (306) 787-4661.
E-mail: JBuchan@agr.gov.sk.ca

TECHNICAL TITLE Horticulture Greenhouse Diagnostician

Refer to Project Number: 19970172 v.:1.3 w168

PROJECT FOCUS: Research to Improve Potato Crop Performance

AFIF FUNDING $270,000 approved. Project completion date: 17 January 2001.

OVERVIEW The Project centred on two objectives:

- development and testing of cost-effective agronomic methods to improve yields and quality of seed potatoes in varieties already in demand in local and export markets; and,
- evaluation of the performance and development of agronomic recommendations for newly released cultivars of interest to Saskatchewan's seed and table potato growers.

Partners in the Project were the Saskatchewan Seed Potato Growers Association (SSPGA), the University of Saskatchewan, and the Canada-Saskatchewan Irrigation Diversification Centre (CSIDC)

RESULTS ACHIEVED The majority of field trials were conducted at the CSIDC in Outlook and the Potato Research Plots associated with the University of Saskatchewan's Plant Sciences Unit, both of which feature sandy loam soil.

Data gathered and analyzed dealt with generation effects, seed tuber types and plant populations, seed handling methods, planting and harvesting dates, spacing and planting depths, irrigation, fertilization, yields and yield potential of new varieties.

KEY CONTACT Dr. Doug Waterer, University of Saskatchewan, (306) 966-5860.
E-mail: waterer@sask.usask.ca

TECHNICAL TITLE Integrated Management Program in Support of Saskatchewan Seed Potato Industry

PROJECT FOCUS: Market Development Research Study: Seed Potatoes

AFIF FUNDING $264,000 approved. Project completion date: 16 July 2001.

OVERVIEW AFIF provided funding for a market research and development program to:

- increase domestic sales, both intra-and-inter-provincially;
- provide an information exchange between researchers, growers and end-users/buyers to assess new market potential in Mexico, Central and South America, and Pacific Rim countries; and,
- develop new markets and expand existing ones in California, Mexico, Central and South America, and Pacific Rim countries.

RESULTS ACHIEVED The profile of the Saskatchewan potato industry was enhanced significantly at the national level, and new markets were accessed in Manitoba, Prince Edward Island and New Brunswick.

Marketing and industry development efforts included industry participation in several trade shows and Canada – United States industry meetings. Increased sales to the U.S. and Mexico were realized.

Inquiries for seed sales and/or seed trials were stronger and in some instances, from unexpected quarters - Egypt and Iran. Indications point to a moderate increase in acres in seed potatoes for the next few years.

KEY CONTACT Dianne Moebis, Saskatchewan Seed Potato Growers Association, (306) 931-7892.
E-mail: sspga@sk.sympatico.ca

TECHNICAL TITLE Seed Potato Market Research and Development

Refer to Project Number: 19960347 v.:1.2 w194

PROJECT FOCUS: Growing Processing Potatoes in Saskatchewan

AFIF FUNDING

$199,000 approved. Project completion date: 25 October 2000.

OVERVIEW

Western Canadian potato production is growing rapidly and Saskatchewan is one of the lowest cost potato producers in North America. The success of processing potato production depends on high yields and superior processing quality. The important quality characteristics include tuber specific gravity, reducing sugar content, and uniformity in tuber size and shape. Suitable cultivars and appropriate cultural practices are essential to produce acceptable yields of processing quality tubers. This is particularly important under the relatively short and cool growing seasons on the Prairies including Saskatchewan. The Project's approach was two-pronged:

- to identify suitable cultivars and management practices for Saskatchewan growing conditions; and,
- to develop cultivar specific agronomic practices to improve yield and quality under a relatively short growing season.

Partners in the Project were Doug Waterer, Dermot Lynch and Lamb-Weston.

RESULTS ACHIEVED

The study was wide ranging and included data gathering in areas of:

- identification of processing cultivars for Saskatchewan growing conditions;
- development of cultivar specific management practices;
- evaluation of European cultivars;
- irrigation scheduling and plant population studies to optimize yield and quality;
- fertility management to increase yield and maintain quality; and,
- determination of suitable planting depth and seed piece type.

Studies demonstrated that a high quality processing potato can be produced in Saskatchewan. Saskatchewan is a prime location for potato production due to lower land cost and availability of suitable irrigated land. At present, 73,500 acres is available in the Lake Diefenbaker development area and another 161,000 acres awaits development in this region.

KEY CONTACT

Jazeem Wahab, Canada-Saskatchewan Irrigation Diversification Centre (CSIDC), Outlook, Sask., (306) 867-5400.
E-mail: wahabj@em.agr.ca

TECHNICAL TITLE

Management Practices for High Quality Processing Potato Production in Saskatchewan

Refer to Project Number: 19970354 v.:1.2 w297

PROJECT FOCUS: Employing an Industry Development Officer

AFIF FUNDING	$165,000 approved. Project Completion date: 30 December 2001.
OVERVIEW	To improve growth in the highly profitable fruit industry a development officer position was funded by AFIF. Six projects were developed and are being implemented to further the goals of the industry. These projects include: 1) Grower Profile Database; 2) Build Awareness of the Fruit Industry; 3) Online Fruit Trading Exchange; 4) Centralize Research Information; 5) Quality Assurance; 6) Market Opportunities
RESULTS ACHIEVED	1) Grower Profile Database – The grower profile database has been completed. As potential new growers are identified they will be included in the survey sample. 2) Build Awareness of the Fruit Industry - The industry development officer (IDO) attended a variety of in-province conferences and industry meetings. The 2000 summer promotional campaign was implemented to support U-Pick operations. 3) On-line Fruit Trading Exchange – A web site targeted at consumers/home gardeners and commercial growers (members) is being developed to meet the needs of both groups. The matchmaker (buy/sell) component is scheduled to be available to growers to list fruit available for sale in late 2001. 4) Centralize Research Information – This project is in the initial stages. 5) Quality Assurance – This project has been initiated by developing a draft of grading standards for Saskatoon berries. Cooperation with industry stakeholders and other provincial grower organizations is essential to success. On-farm food safety criteria are currently being developed. 6) Market Opportunities – Primary research and various initiatives are currently being undertaken to help growers develop new markets for fruit and to support the development of the necessary infrastructure.
KEY CONTACT	Sandy Purdy, Saskatchewan Fruit Growers' Association, (306) 645-4447. E-mail: cas.lyn@sk.sympatico.ca Joanne Benesh, (306) 664-4770. E-mail: joannebenesh@sk.sympatico.ca
TECHNICAL TITLE	Industry Development Officer for Saskatchewan Fruit Industry

Refer to Project Number: 19970365 v.:1.3 w291

PROJECT FOCUS: Tools for QA in the Herb, Fruit and Vegetable Sectors

AFIF FUNDING

$152,000 approved. Project completion date: 27 January 2000.

OVERVIEW

The ability to evaluate quality components such as color, medicinal compounds and sugar content in fresh, stored and processed horticultural crops is critical to the continued growth and expansion of the herb, fruit and vegetable sectors.

The University of Saskatchewan was given AFIF funding to purchase several pieces of equipment for the evaluation of quality components in horticultural fruit, vegetables and herbs. It is intended that this equipment will eventually form the core of a new Plant Quality Analysis Centre at the University of Saskatchewan.

RESULTS ACHIEVED

This equipment has strengthened the university's research and development programs that support the horticultural industry.

Four pieces of high-tech, laboratory equipment were purchased in this project:

- a texture analyzer to study the effect of storage/storage techniques on fruits and vegetables, specifically berries and potatoes;
- a mass sugar analyzer;
- a high performance liquid chromatograph (HPLC) to determine the chemical components of herbs, fruit and vegetables; and,
- a high performance thin layer chromatograph (HPTLC) that can analyze herbs and herb products to determine:
    1) best harvest time to maximize the potency of medicinal herbs;
    2) the influence of various agronomic practices on the chemical content of medicinal herbs; and,
    3) best processing techniques for the highest quality extract.

KEY CONTACT

Oliver Green, Saskatchewan Vegetable Growers' Association, (306) 867-8999.
E-mail: greeno@em.agr.ca

TECHNICAL TITLE

Instrumentation for Quantitative Evaluation of Quality Components to Support the Herb, Fruit and Vegetable Horticulture Sectors

Refer to Project Number: 19970207 v.:1.2 w260

PROJECT FOCUS: Marketing Strawberry Crowns and Garlic to the U.S.

AFIF FUNDING

$140,000 approved. Project completion date: 31 December 2001.

OVERVIEW

This Project's focus is threefold:

- to test the California market for sales of Saskatchewan-grown strawberry crowns and garlic seed and verify their growth-yield capabilities in that U.S. state;
- to fine tune cultural/management practices and define economic storage methods for sale of strawberry crowns and garlic in domestic markets; and,
- to provide training and education to the industry/agrologists in regions where strawberry crowns and garlic may be grown and harvested.

Partners in the Project include the Saskatchewan Fruit Growers Association; Norcal Nurseries; Saskatchewan Agriculture and Food; the University of Saskatchewan; and, Thomson International Inc.

RESULTS ACHIEVED

Field trials continue with some California commercial growers with yields varying depending on the grower. Initial production levels show promise, but storage temperatures appear to be the key factor in keeping inventories of product. More studies are being completed.

In Saskatchewan, strawberry crown production expanded and all crowns have been pre-sold at prices 63% higher than California-sourced crowns.

Field trials for garlic continue. Medicinal components in certain Saskatchewan-grown garlic is significantly higher than the same garlic from California sources.

KEY CONTACT

Dr. Karen K. Tanino, University of Saskatchewan, (306) 966-8617.
E-mail: tanino@sask.usask.ca

TECHNICAL TITLE

Northern Vigour of Strawberry Crowns and Garlic

Refer to Project Number: 19970353 v.:1.1 w220

PROJECT FOCUS: Improving Potato Yields Through Crop Rotations

AFIF FUNDING

$135,000 approved. Project completion date: 31 March 2002.

OVERVIEW

Adopting proper crop rotations and appropriately managing soil, water, nutrients, weeds, insects and disease are some of the keys to sustainable crop production. This is particularly important for a high-value, high-risk, and high-input crop such as the potato. The Project is studying crop rotations to understand what crop(s) should precede and follow a potato crop to derive maximum benefit from the inputs applied to the crop.

RESULTS ACHIEVED

This study is examining the agronomic and economic impacts of long and short-term potato-based rotations with cereals, oilseeds, and pulses in the cropping sequence. A variety of crop options in combination with potatoes are being evaluated to develop sustainable crop rotations.

One study examined the 'seed' and 'consumption' grade yield potential for five contrasting potato cultivars (Norland, Russet Burbank, Russet Norkotah, Ranger Russet, and Shepody) at three nitrogen and two phosphorous levels when grown on wheat, canola, and dry bean stubble. All potato cultivars produced similar 'seed' grade yields when grown on the different crop stubble. However, during one year, potatoes grown on canola stubble produced higher 'consumption' grade relative to wheat stubble.

Another study examined the performance of field crops (durum wheat, canola, field pea, dry bean) when grown after potato. Results indicate that durum wheat, pea, canola, and dry bean grown after potato produced high (average to above average) yields without using any additional fertilizer, i.e. by utilizing the residual fertilizer applied to the potato crop.

KEY CONTACT

Jazeem Wahab, Canada-Saskatchewan Irrigation Diversification Centre (CSIDC), (306) 867-5400.
E-mail: wahabj@em.agr.ca

TECHNICAL TITLE

Agronomic Impact and Economic Viability of Crop Sequences in Potato Rotation

Refer to Project Number: 19980161 v.:1.2 w281

PROJECT FOCUS: Improving Vegetable Production Techniques

AFIF FUNDING $100,000 approved. Project completion date: 9 November 1999.

OVERVIEW There were two focus areas for this Project:

- the development of Saskatchewan-based Cost-of-Production data for some commonly grown vegetables and determining the break even costs as a factor in rationalizing equipment purchases; and,
- demonstrating the efficiency of drip irrigation and using floating row covers, plastic mulches and tunnels in the production of high-value vegetable crops.

RESULTS ACHIEVED At a 7% "in season" self-sufficiency rate in terms of vegetable production, Saskatchewan imports about $20-million of fresh vegetables annually. In an effort to exploit this significant diversification opportunity, this vegetable production research project began in 1996. Newer production techniques and production costs data were gathered and analyzed.

One-half-acre fields of pumpkin, carrots, cabbage, cucumber and pepper were grown to simulate a commercial production model. Yield rates and product quality were found acceptable. Net returns were positive for the most part, with the significant labor component being a crucial variable in terms of production efficiencies.

The Project's stimulus has provided the Saskatchewan vegetable industry with further impetus and direction. A number of new producers and a new generation cooperative appear poised to further diversify the province's agricultural landscape with "Sask Grown" vegetables.

KEY CONTACT Mr. Laurie Tollefson, Saskatchewan Irrigation Diversification Centre, (306) 867-5404.
E-mail: tollefsonl@em.agr.ca

TECHNICAL TITLE Demonstration of Improved Vegetable Production Techniques for Saskatchewan

Refer to Project Number: 19960356 v.:1.2 w231

PROJECT FOCUS: Developing and Evaluating Cultivation Techniques for Fruit Varieties

AFIF FUNDING

$91,000 approved. Project completion date: 25 July 2000.

OVERVIEW

The Project centred on collecting agronomic and fruit quality data from previous established cultivar field trials of Prairie native fruit species including chokecherry, pincherry, highbush cranberry, black currant, ligonberry and blueberry.

The study also evaluated and selected new cultivars suitable for production and processing, as well as establishment of new field trials where promising, unnamed selections could be compared with existing, named cultivars.

Partners in the Project were the Canada-Saskatchewan Irrigation Development Centre (CSIDC) at Outlook, Sask., and the Prairie Farm Rehabilitation Administration (PFRA) at Indian Head, Sask.

RESULTS ACHIEVED

This study encompassed the first set of comprehensive cultivar trials for the above-mentioned fruit species. Initially, the trials were established in the Fall of 1994 at seven locations in Saskatchewan. Data collection included survival rates, growth rates, sucker production, yield per plant and fruit size. Observations of flowering time, disease susceptibility and insect problems were also collected. Fruit quality was examined where yields permitted.

Economically viable yields for some of these fruit species have been identified. A number of conference papers and presentations, publications and reports are also outlined in the study.

KEY CONTACT

Dr. Richard St-Pierre, University of Saskatchewan, (306) 966-5867.
E-mail: stpierre@sask,usask.ca

TECHNICAL TITLE

Cultivar Evaluation Trials and New Cultivar Development for Native Fruit Species

PROJECT FOCUS: Improving Production and Quality in Berry Crops

AFIF FUNDING $84,000 approved. Project completion date: 25 July 2000.

OVERVIEW Developing irrigation and fertilizer guidelines for saskatoon and chokecherry crops formed the main thrusts of this Project. Objectives included:

- gauging how the timing and quantity of irrigation affect growth, yield and quality in the two fruits;
- defining guidelines for irrigating the crops;
- seasonally tracking change in leaf tissue and soil nutrient levels at a number of orchard locations in the province;
- relating soil nutrient level changes to growth, yield and fruit quality; and,
- development of guidelines for fertilization programs.

Partners in the Project were Canada-Saskatchewan Irrigation Diversification Centre (CSIDC) at Outlook, Sask., and the Prairie Farm Rehabilitation Administration (PFRA) at Indian Head, Sask.

RESULTS ACHIEVED In large part, the study objectives were met. Project achievements included a significant volume of data. Some of the data included:

- five publications, eight reports and five presentations;
- using soil moisture sensors to set general irrigation guidelines for the two berry species;
- data gathering or typical leaf nutrient concentrations;
- setting general guidelines for fertilizer programs; and,
- an expression of interest from the Saskatchewan Fruit Growers Association to see more study done in irrigation and fertilizer programs for fruit crops.

KEY CONTACT Dr. Richard St-Pierre, University of Saskatchewan, (306) 966-5867.
E-mail: stpierre@sask.usask.ca

TECHNICAL TITLE Development of Irrigation and Fertilization Guidelines to Enhance Saskatoon and Chokecherry Production and Fruit Quality

Refer to Project Number: 19960364 v.:1.2 w243

PROJECT FOCUS: Field Trials for Controlling Chokecherry Pests

AFIF FUNDING $81,000 approved. Project completion date: 26 November 1999.

OVERVIEW Currently there are no minor use registrations for insecticides for controlling pests on fruit bearing choke cherry bushes. As the chokecherry fruit industry continues to develop and commercial orchards come into production, there will be a need to control various pests that threaten fruit and leaves of the chokecherry.

Minor use registrations will only occur if trials are conducted to study the efficacy and safety of control products. Major chemical manufacturers are not interested in conducting trials due to the small market potential.

The Project was centred on testing three pest control products on two fruit pests and two defoliators identified through interviews with fruit growers and specialists.

RESULTS ACHIEVED Laboratory analyses of residue samples were completed according to Health Canada pesticide registration guidelines.

Pests identified for the pesticide study were the chokecherry gall midge and the choke cherry sawfly. Defoliators selected were the ugly nest caterpillar and the Prairie tent caterpillar.

At least three field trials were conducted for each minor use registration request. Data collected included phytotoxicity ratings, damage ratings, population counts, fruit quality and quantity, and fruit samples residue analysis.

The Project's success will be measured by the number of pest control options that are developed for chokecherry orchards and the amount of technical information that becomes available through presentations, field days, demonstrations and written material.

KEY CONTACT William Schroeder, Agriculture and Agri-Food Canada, (306) 695-5126.
E-mail: schroederb@em.agr.ca

TECHNICAL TITLE Insect Pest Control for Chokecherry Fruit Production

Refer to Project Number: 19960350 v.:1.1 w259

PROJECT FOCUS: Studying High Tunnel Options for Vegetable Crops

AFIF FUNDING

$81,000 approved. Project completion date: 15 December 2000.

OVERVIEW

One of the key factors in limiting commercial vegetable production in Saskatchewan is the shortness of the growing season and the variability of the growing conditions. Production of the higher value 'warm season' crops is particularly difficult unless some means of modifying and improving growing conditions for the crop is used. Plastic mulches and crop covers are effective means for improving the microculture surrounding the crop.

The Project's main thrust was to demonstrate the 'high tunnel' system for bettering productivity and profitability of vegetable crops. High tunnels are similar to low tunnels in design and function, except that:

- one tunnel covers several rows;
- the high tunnels are wide enough to allow crop growth to full maturity under the tunnels; and,
- the tunnels are tall enough to allow for most cultural practices such as spraying, cultivation and harvesting to occur with the tunnels intact.

The University of Saskatchewan Department of Plant Sciences was a partner in the Project.

RESULTS ACHIEVED

High tunnels (about 5 metres wide by 2.5 metres high, with length dependent on field dimensions) were put up at field trial sites at Outlook and Saskatoon, Sk. Six-millimetre polyethylene was used to cover aluminum arch ribs. There were no heating or cooling systems, only rolling up the poly on the sides and opening end doors for ventilation and crop pollination by insects.

Data gathering and analysis was done on melons, peppers, tomatoes and strawberries were used in the. Relative to the standard plasticulture systems, the high tunnels did not provide substantial yield advantage to offset their much higher purchase and operating costs. However, the high tunnels showed that warm season fruits and vegetables can be grown successfully on a consistent basis in Saskatchewan.

More work is required in terms of construction costs, crop selection and agronomic and marketing to further enhance and develop high tunnel production.

KEY CONTACT

Laurie Tollefson, Canada-Saskatchewan Irrigation Diversification Centre (CSIDC),
(306) 867-5404.
E-mail: tollefsonl@em.agr.ca

TECHNICAL TITLE

Demonstration of Improved Vegetable Production Techniques for Saskatchewan

PROJECT FOCUS: Becoming More Competitive in the Nursery Trade

AFIF FUNDING

$72,000 approved. Project completion date: 28 March 2001.

OVERVIEW

The nursery industry is one of the most rapidly growing sectors in horticulture. In order to compete effectively with out-of-province suppliers and with mass marketers, Saskatchewan growers need to adopt techniques that will increase quality and/or reduce production costs.

The Project's main objective involved providing nursery growers with new and innovative management tools and techniques to further stimulate the particular sector of the horticulture industry.

The results of this study may assist with agroforestry initiatives and increased carbon sequestration.

RESULTS ACHIEVED

Data was collected and analyzed in three study areas:

- foliar feeding of caliper trees to accelerate growth;
- timing and frequency of shearing of containerized shrubs to promote 'shrubbiness'; and,
- developing dormancy management strategies for field-grown trees through the use of plant regulators and defoliants.

KEY CONTACT

Tim van Duyvendyk, Saskatchewan Nursery Trades Association, (306) 249-1222.
E-mail: Dutch.grow@home.com

TECHNICAL TITLE

Improving Management of Container and Field Grown Nursery Stock Using Innovative Techniques

Refer to Project Number: 19960353 v.:1.2 w175

PROJECT FOCUS: Controlling Weeds in Bush Fruit Orchards

AFIF FUNDING $71,000 approved. Project completion date: 9 November 1999.

OVERVIEW Effective and safe weed management is an integral part of successful agricultural operations. Canadian herbicide registrations for bush fruits such as saskatoon, chokecherry, buffaloberry, sea buckthorn and highbush cranberry are extremely limited.

The Project's emphasis was on conducting herbicide screening trials using 'minor use registrations' for the five berries selected.

Development of a native fruit industry that uses orchard produced berries will lessen the pressure on wild harvest sites.

RESULTS ACHIEVED Through interviews with fruit growers and weed specialists, a number of weeds were targeted for the screening trials. Environmental impact was minimal at the seven trial sites.

The procedures for the trials on fruit bearing orchards were similar to parameters set for newly-established, non-fruit bearing orchards, except fruit samples were taken so herbicide residue analysis could be completed. Residue analysis was done by a recommended commercial laboratory, according to Health Canada protocols.

The overall success of the Project will be measured by the number of new herbicide/fruit species registrations available for bush fruit orchards, and the amount of information that becomes available through presentations, field days, demonstrations and written material. More fruit plants will be sold and orchards established if herbicides are available to control weeds safely and efficiently.

KEY CONTACT William Schroeder, Agriculture and Agri-Food Canada, (306) 695-5126.
E-mail: schroederb@em.agr.ca

TECHNICAL TITLE Screening of Herbicides for Weed Management in Bush Fruit Orchards

Refer to Project Number: 19960351 v.:1.1 w243

PROJECT FOCUS: Washing Berries to Improve Quality and Shelf Life

AFIF FUNDING

$63,000 approved. Project completion date: 31 March 2001.

OVERVIEW

The Project proposed three objectives:

- development of a pilot-scale operation for washing and drying saskatoon berries in accordance with recommended food safety guideline for fresh produce processing;
- examination of the effects of hot and cold water washing treatment, followed by drying, on the shelf life of fresh saskatoon berries; and,

determination of the optimum time-temperature combinations for the wash/dry unit to maximize shelf life of fresh-packed saskatoon berries.

RESULTS ACHIEVED

A pilot-scale processing operation was assembled in the Saskatchewan Food Industry Development Centre Inc. (Food Centre) in Saskatoon.

In broad, general terms, the hot water applications yielded more positive results and the overall quality of the fruit was not compromised by washing and drying. Initially, the hot water wash caused minor detrimental physiological changes, but it appeared to delay deterioration as the storage period progressed. Yeast, mold and microbial growth were reduced.

KEY CONTACT

Dr. Richard St-Pierre, (306) 966-5867.
E-mail: stpierre@sask.usask.ca

TECHNICAL TITLE

Determination of the Effects of Hot and Cold Water Washing and Drying on the Shelf Life of Fresh Saskatoon Berries

Refer to Project Number: 19980145 v.:1.1 w196

PROJECT FOCUS: Improving Christmas Tree Growth

AFIF FUNDING

$40,000 approved. Project completion date: 24 April 2001.

OVERVIEW

The Project was designed to help Christmas tree growers with technical information on fertilization and establishment of seed orchards to increase their production capabilities.

The Saskatchewan Christmas Tree Growers Association deals mostly in Balsam Fir, Scots Pine and White Spruces species.

The availability of improved plant material and new varieties adapted to grow well in Saskatchewan will increase annual production and reduce labor costs, thus, giving Saskatchewan growers a competitive advantage over less fresh and lower quality trees that are imported into the province. Greater production levels in the province could also lead to more exports of Saskatchewan grown Christmas trees.

The Prairie Farm Rehabilitation Administration (PFRA) Shelterbelt Centre was a partner in the Project.

RESULTS ACHIEVED

A seed orchard was established at the PFRA Meeting Lake Pasture in Northwest Saskatchewan. Another seed orchard was prepared for a Fall 2000, planting. Both facilities were fenced to keep out deer and other animals.

Fertilizer programs to increase growth and quality in Balsam Fir and Scots Pines yielded limited results and little benefit. A growers' guide to fertilizing Christmas trees has been produced.

Growers can now purchase consistent supplies of hardy seedlings from the orchards. This reduced their reliance on imported tree seeds of questionable adaptability and quality.

KEY CONTACT

Henry O'Reilly, Saskatchewan Christmas Tree Growers Association, (306) 693-2062.
E-mail: comesee@comesaw.com

TECHNICAL TITLE

Improved Trees and Technology for Christmas Tree Production in Saskatchewan

PROJECT FOCUS: Disease Forecasting and Prevention in Potatoes

AFIF FUNDING

$40,000 approved. Project completion date: 28 January 2000.

OVERVIEW

AFIF, the Saskatchewan Seed Potato Growers Association, Inc. (SSPGA), SPUDCO and the Lake Diefenbaker Potato Corporation jointly funded a project to establish a series of environmental monitoring stations in the major potato-growing regions of the province. The purpose of these stations was to warn potato growers of environmental conditions that favor the development of late blight, a fungal disease that can devastate potato crops.

Severe outbreaks of late blight have occurred in Manitoba, North Dakota and Idaho, and lesser outbreaks in Montana and Alberta. Late blight has also made an appearance in Saskatchewan. Fungicide can prevent or control an outbreak, but the product is very expensive and multiple applications throughout the growing season are necessary to ensure 100 per cent coverage. However, by providing potato growers with a warning of conditions favorable to the development of late blight, growers can adjust their spray schedules to the optimum rotation for adequate protection at the least cost.

RESULTS ACHIEVED

Eleven environmental monitoring stations were purchased and established in the major potato growing areas of the province. Two more stations have subsequently been purchased, raising the number to 13. Stations are now located in the following areas: Yorkton, Carrot River, Nipawin, Tisdale, Quill Lake, Scott, Lumsden Valley, Saskatoon, Outlook/Broderick and Riverhurst. These on-site monitoring systems provide data for a disease prediction program through cellular telephone and modem links to a central computer system.

Environmental information is distributed to potato producers via a toll-free telephone line (1-877-906-6611), through a fax service provided by the SSPGA and the Saskatchewan Agriculture and Food (SAF) website - http://www.agr.gov.sk.ca/

KEY CONTACT

Dianne Moebis, Saskatchewan Seed Potato Growers Association, (306) 931-7892.
E-mail: sspga@sk.sympatico.ca

TECHNICAL TITLE

Monitoring of In-Field Microenvironment for Disease Forecasting and Prevention

PROJECT FOCUS: Improving Aquaculture Research in Saskatchewan

AFIF FUNDING	$40,000 approved. Project completion date: 27 January 2000.
OVERVIEW	Through the use of locally grown products, the Project emphasized the development of value-added agricultural ingredients for the aquaculture industry in Saskatchewan. It also advocated development of an accessible facility for fish research.
RESULTS ACHIEVED	A research facility was constructed and made fully operational. The research space is located in the Livestock Research Building on the University of Saskatchewan Campus, which ensures segregation of fish research with other animal studies. It is equipped with floor drains, a water supply and a separate entrance. The research area contains 30 bottom-drain tanks, each containing 228 litres (60 gallons) of water. A Culligan activated carbon filter is used to remove chlorine and chloramines, prior to entering the tank system. Creation of the facility is spurring interest in developing aquaculture feed ingredients from Prairie products.
KEY CONTACT	Dr. Leigh Campbell, University of Saskatchewan, (306) 966-4119. E-mail: leigh.campbell@usask.ca
TECHNICAL TITLE	Prairie Aquaculture Research Facility Renovation Project

PROJECT FOCUS: Identifying Winter-Hardy Perennials in Field Trials

AFIF FUNDING $38,000 approved. Project completion date: 31 January 2002.

OVERVIEW One of the fastest growing areas in the bedding plant industry is the demand for perennial plants. Expanding the variety of perennials available requires testing to ensure plants are winter-hardy.

The Project's objectives include:

- identifying new perennial plant species/cultivars for Saskatchewan conditions;
- expanding and strengthening the greenhouse industry's plant base; and,
- meeting the demand by the general public, landscape architects, municipal purchasing offices and land developers for new plant material.

Partners in the Project are Day Grow Greenhouses in Saskatoon and the University of Saskatchewan Department of Horticulture Science in Saskatoon.

RESULTS ACHIEVED Plants are being evaluated at the University of Saskatchewan Department of Horticulture as well as on grower sites. Areas of data gathering for the perennials include survival, vigour rating, propensity to, and robustness of, flower, color rating and relative growth rate.

In North America, the annual growth rate for the greenhouse and nursery sectors is estimated at 12-to-15%. The current market value of Saskatchewan's greenhouse industry is set at $18 million to $20 million with production potential at $55 million to $65 million, creating new full time employment of 250-350 jobs. Increased plant material production will result in increased potential export as well as increased domestic sales.

Once hardy perennials are identified from field trials, commercial application is immediate since projects are being conducted on greenhouse industry sites. Since named cultivars are being used, results can be adopted by the industry without significant delay.

KEY CONTACT Brian Day, Saskatchewan Greenhouse Growers Association, (306) 374-4022.
E-mail: N/A

TECHNICAL TITLE Cold Hardiness Trials of New Perennial Cultivars for Domestic and Export Markets

Refer to Project Number: 19960390 v.:1.1 w285

PROJECT FOCUS: Retrofitting a Greenhouse to Improve Production

AFIF FUNDING

$30,000 approved. Project completion date: 30 November 1998.

OVERVIEW

The Project revolved around retrofitting the Canada-Saskatchewan Irrigation Diversification Centre (CSIDC) at Outlook, Sk. for:

- year round production of selected medicinal herbs to evaluate productivity and the economics of growing herbs in the greenhouse;
- development of methods to raise transplants of annual and perennial medicinal herbs; and,
- production of vegetable transplants for agronomic and demonstration projects.

RESULTS ACHIEVED

The retrofit has resulted in increased research and development in herbs and vegetables.

KEY CONTACT

Oliver Green, Saskatchewan Vegetable Growers Association (SVGA), (306) 867-8999.
E-mail: N/A

TECHNICAL TITLE

Retrofit the Greenhouse at the CSIDC to (1) Year Round Production of Herbs and (2) Raise Herb and Vegetable Transplants

PROJECT FOCUS: Expanding Northern Vegetable Production

AFIF FUNDING	$30,000 approved. Project completion date: 9 August 2001.
OVERVIEW	To establish, by 2005, the production of 101.2 hectares (250 acres) of cabbage and 202.4 hectares (500 acres) of carrots in the North East region of Saskatchewan, with an estimated market value of $2.5 million to $3.5 million. The Project also has targeted development of acreages of broccoli, cauliflower and onions, according to market demand and economic potential of these crops. Partners in the Project include Saskatchewan Agriculture and Food, the University of Saskatchewan, and various industry processor and wholesaler representatives.
RESULTS ACHIEVED	Working with local growers and industry representatives, the Project has now completed its third year of gathering production data on growing cabbage in the region. Using irrigation methods, production trials are showing yields ranging from 7.27 tonnes to 14.54 tonnes per hectare (20 to 40 tons per acre). Cost-of-Production data for the Project shows producers getting a net return of about $480 per hectare ($1,200 per acre). The cabbage is being marketed to the processing industry and through wholesalers to stores and restaurants. Production trials for carrots and onions were carried out for 2000, but yield and Cost-of-Production data on the trials have not been completed. Details on the Project are being distributed through various communications vehicles.
KEY CONTACT	Karen Grayson, District No. 31 Agriculture Development and Diversification (ADD) Board, (306) 862-3380. E-mail: dkgrayson@sk.sympatico.ca
TECHNICAL TITLE	Development of the Vegetable Industry in North East Saskatchewan

PROJECT FOCUS: Increasing Market Share for the Fruit Industry

AFIF FUNDING $30,000 approved. Project completion date: 1 June 2001.

OVERVIEW

The focus of the Project was to develop a consistent system for gathering information on key industry parameters in on-going surveys of the Saskatchewan Fruit Industry. Using Internet tools, the Project involved execution of detailed economic analysis of alternative systems marketing berries from grower to processor, including new business strategies and computer-based models.

Much of the study surrounded on the economics of secondary processing and integrated primary and secondary processing. Three sizes of operating processing plants capable of handling 90,000, 180,000 and 360,000 kilograms (200,000, 400,000 and 800,000 pounds) of product were studied during the Project.

Mr. Robin D'Arcy, of the University of Saskatchewan, was a partner in the Project.

RESULTS ACHIEVED

The study's main focus was on the Saskatoon berry industry and whether it can develop a value-added sector that is economically viable.

It examines the grocery-retail markets and what is a secondary processor needs to penetrate this market. Other research areas look at alternative business arrangements including partnerships, corporate, and cooperative (traditional and new generation).

In a variety of industry areas, researchers reached a number of conclusions including (but not limited to): the need for vertical integration; supply chain management; the economics of multiple fruit production and processing; new product development; cleaning and freezing; and, marketing.

KEY CONTACT

Dr. Gary Storey, University of Saskatchewan, (306) 966-4020.
storeyg@duke.usask.ca

TECHNICAL TITLE

Information and Marketing Requirements for the Economic Development of the Saskatchewan Fruit Industry

PROJECT FOCUS: Using Sea Buckthorn Berry in Nutraceutical Products

AFIF FUNDING

$25,000 approved. Project completion date: 9 November 1999.

OVERVIEW

Sea Buckthorn produces a wide range of products (components) that fit into the growing nutraceutical and health food markets. It is used in both herbal and traditional medicines in Asia, while in Europe it is used as a vitamin supplement, in cosmetics, in condiments and in fruit juice drinks. In Canada, fruit juices and oil extracts are the main products utilizing Sea Buckthorn berry extracts.

Studies are being carried out by the Prairie Farm Rehabilitation Administration (PFRA) at Indian Head to develop varieties suited to Saskatchewan (Prairie) conditions. Harvest technology is also being researched.

AFIF funded a market analysis study to look at the potential for the Sea Buckthorn plant, its oils, juice and leaves.

RESULTS ACHIEVED

Estimating the demand for Sea Buckthorn products in North America is difficult due lack of market data. However, literature on its uses in China, Russia and Europe support a general conclusion that markets for Sea Buckthorn have been established. The great interest in Chinese herbal medicines and alternative medicines amongst North Americans should lend support for the adoption of Sea Buckthorn products in Canada and the U.S. Areas of possible growth for Sea Buckthorn components could include: cosmetics, herbal teas, and juices, but further market study is needed.

KEY CONTACT

William Schroeder, Agriculture and Agri-Food Canada, (306) 695-5126.
E-mail: schroederb@em.agr.ca

TECHNICAL TITLE

Development of Marketable Nutraceutical Products Using Sea Buckthorn Berries

PROJECT FOCUS: Reducing Potato Bruising with Technology

AFIF FUNDING $10,000 approved. Project completion date: 25 September 1999.

OVERVIEW The Project was aimed at decreasing bruise injuries during potato harvesting and raising awareness about the importance of proper handling procedures. This was accomplished by providing member growers with technical support and a tool for assessing the efficiency of their harvesting equipment and bruise prevention management.

Instrumented sphere technology is used to identify areas in the harvesting process where equipment and/or handling may result in bruising of potatoes going into storage.

Bruising on produce creates an entry point for bacteria, as well as decreasing its quality. It is important to note areas where equipment adjustments, additional padding or alternate handling procedures may reduce bruise potential.

By running a sphere containing data gathering instrumentation through harvesting and handling equipment, producers can determine the efficiency of their equipment.

RESULTS ACHIEVED Computer analysis of data collected by the instrumented sphere can determine the strength and duration of the impacts on the potatoes. Trouble spots in the harvesting operation can be remedied to reduce the bruising. The technology not only shows what needs to be adjusted, but also where adjustments have been beneficial.

A good illustration of the technology occurred with two trans-load lines working side-by-side. One had been more "fine-tuned" than the other. The sphere was then run through each line. The difference between the amounts of bruise potential of the two lines was striking. The equipment operator was able to take the results back to his foreman to show him that the extra time and effort put into adjusting the one line had made a significant difference, and suggested the other line be similarly adjusted.

KEY CONTACT John Konst, Saskatchewan Seed Potato Growers Association, (306) 867-8939.
E-mail: sspga@sk.sympatico.ca

TECHNICAL TITLE Instrumented Sphere Evaluation of Potential for Bruise Injury During Harvest

Refer to Project Number: 19970213 v.:1.1 w306

Information *Technology*

AGRI-FOOD
INNOVATION
FUND

Canadä Saskatchewan

Project *Focus.*

71 Enhancing the AgriCarta Information System
72 On-line Skills Training in the Ag Sector
73 Growing Agriculture Businesses on the Internet
74 Using Internet Tools to Disseminate Information
75 I.T. Education and Training – Year 1
76 Identifying IT Needs in the Agricultural Sector

PROJECT FOCUS: Enhancing the AgriCarta Information System

AFIF FUNDING

$745,000 approved. Project completion date: 8 November 2000.

OVERVIEW

AgriCarta is an agricultural information retrieval system on the Internet that brings the advantages of merging information technologies (IT) to the agricultural community in Saskatchewan.

The Project's emphasis was a fine-tuning of the system with a view to prioritizing subject areas and partnerships.
Partners in the Project were: Rarebit, Brown Communications and AgInfoNet.

Some content provisions arrangements have also been established with Saskatchewan Agriculture and Food; Alberta Agriculture, Food and Rural Development; and, Manitoba Agriculture and Food.

RESULTS ACHIEVED

More than 6,000 documents organized into almost 900 subject areas have been pu online.

AgriCarta's parent company, AgInfoNet Canada Corporation has renegotiated a new contract with Environment Canada to ensure that the availability of weather information for rural users is second to none in Canada. More radar maps and satellite imagery have been incorporated.

A number of enhancements have been made to AgriCarta including a new look, additional logos and links to other sites, and significant improvements to the "Buy and Sell" area on the Web site.

KEY CONTACT

Doug McNair, AgInfoNet Inc., (306) 789-5153.
E-mail: dmcnair@aginfonet.com

TECHNICAL TITLE

AgriCarta – An Integrated Electronic Information System for Saskatchewan's Agri-Food Industry – Enhancing the AgriCarta Information System

PROJECT FOCUS: On-line Skills Training in the Ag Sector

AFIF FUNDING

$689,700 approved. Project completion date: 31 March 2001.

OVERVIEW

Development and delivery of programs that compliment and/or enhance existing programs and courses.

RESULTS ACHIEVED

In 1998-99 more than 800 persons accessed information about technology training and more than 500 persons took part in direct training opportunities including:

- live agricultural webcasts on the Internet;
- on-line seminars;
- ag information workshops;
- web site creation and maintenance workshops;
- industry seminars; and,
- training the Trainer sessions

In 1999-2000, about 1,300 persons accessed information technology training opportunities through the Project. MTAI provided sponsorship for information technology speakers at six conferences, providing information to about 800 persons. Direct training opportunities provided training to about 500 participants in such areas as the Internet for Farmers, Working the Web for Ag Info (delivered on-line and in classroom), and Information Technology at Work in the Agriculture Business.

A number of communications tools were also used to promote the Project.

KEY CONTACT

Brenda Stefanson, P.Ag., Agricultural Institute of Management in Saskatchewan (AIMS), (306) 975-8927.

E-mail: stefansonb@sccd.sk.ca

TECHNICAL TITLE

AIMS Information Technology: Increased Education and Training Managing Technology for Agricultural Information (MTAI)

PROJECT FOCUS: Growing Agriculture Businesses on the Internet

AFIF FUNDING

$260,300 approved. Project completion date: 31 August 2001.

OVERVIEW

This Project continues to build on the information technology (IT) infrastructure growing within the agricultural sector. In focusing on interactive applications and their sustainability, the Project objectives include:

- building on existing areas of expertise and experiences;
- developing relationships between key Saskatchewan stakeholders and their areas of knowledge and expertise;
- continuing to build an adequate IT infrastructure – and support - to sustain business relationships, programs and services that will enable long lasting economic benefits.

Project Partners are the University of Saskatchewan; Saskatchewan Trade and Export Partnership (STEP); Saskatchewan Agriculture and Food (SAF); Saskatchewan Opportunities Corporation (SOCO); AgInfoNet; and, other industry stakeholders.

RESULTS ACHIEVED

AgInfoNet staff members have attended a number of trade shows, conferences and events across Canada marketing and promoting Saskatchewan's expertise in interactive IT.

A 15-month term position was created at the University of Saskatchewan to assist faculty and staff in taking full advantage of available multi-media tools.

A number of industry stakeholders continue to be attracted to – and participate in - the AgInfoNet Web site.

MAINstreet, a secure electronic online marketplace for agriculture and food products was launched and continues to grow.

KEY CONTACT

Doug McNair, AgInfoNet Inc., (306) 789-5153.
E-mail: dmcnair@aginfonet.com

TECHNICAL TITLE

Completing the Strategic Circle: Focusing on Sustainability and Permanency

PROJECT FOCUS: Using Internet Tools to Disseminate Information

AFIF FUNDING

$155,000 approved. Project completion date: 18 May 2000.

OVERVIEW

AgriCarta is an Internet-based agricultural information retrieval system that brings the advantages of emerging information technologies (IT) to Saskatchewan's on-line agricultural community.

This three-year Project's main thrust was to provide information and services – via AgriCarta – to Saskatchewan producers in order to reduce access costs, enhance timeliness, enhance decision-making support, and improve access to markets and market information.

RESULTS ACHIEVED

AgriCarta has been instrumental in establishing linkages for various producer groups through innovative web site offerings in such areas as:

- ag industry links;
- buy and sell;
- weather information from Environment Canada; and,
- market news and numbers.

AgriCarta has also been actively involved in promoting e-commerce solutions to the agricultural sector through brochures, seminars, workshops and conference participation.

KEY CONTACT

Doug McNair, AgInfoNet Inc., (306) 789-5153.
E-mail: dmcnair@aginfonet.com

TECHNICAL TITLE

AgriCarta – An Integrated Electronic Information System for Saskatchewan's Agri-Food Industry

PROJECT FOCUS: I. T. Education and Training -- Year 1

AFIF FUNDING

$150,000 approved. Project completion date: 19 November 1998.

OVERVIEW

In order to increase the acceptance and use of information technology (IT) by the agricultural sector, AFIF awarded a contract to the Agricultural Institute of Management in Saskatchewan (AIMS) for the delivery of a three-year initiative in IT education and training.

Objectives of this initiative were to assist farmers and agricultural organizations to:

- acquire information on a wide range of information technologies;
- select the appropriate technology for their information needs; and,
- gain competency in managing the new technologies to access and share information.

RESULTS ACHIEVED

During Year 1, February to June, promotional material (letterhead, business cards, logo, etc.) was developed and the project was renamed Managing Technology for Agricultural Information (MTAI). Agricultural organizations were contacted about the new project and invited to focus groups/workshops held in March, 1998, in Regina and Saskatoon, respectively. Several agricultural organizations were consulted to ensure that training courses were customized to meet the specific needs of those organizations and their memberships.

The first course offered under MTAI was "Creating and Maintaining an Effective Web Site", which was developed by the Prairie West Regional College. All of the available spaces were quickly filled.

A pool of resources for the program has been developed from individuals and agencies, such as SaskTel and Sympatico, which provide services/expertise in areas of information technology.

Further program and project development will continue in years two and three of the project.

KEY CONTACT

Brenda Stefanson, AIMS (306) 975-8927.
E-mail: stefansonb@sccd.sk.ca

TECHNICAL TITLE

Agricultural Institute of Management in Saskatchewan (AIMS) - Increased Information Technology Education and Training -- Year 1

Refer to Project Number: 19970346 v.:1.2 w280

PROJECT FOCUS: Identifying IT Needs in the Agricultural Sector

AFIF FUNDING $20,000 approved. Project completion date: 17 December 1997.

OVERVIEW The major thrust of this Project was to assess the information technology (IT) market of Saskatchewan's agri-food industry, specifically the requirements of the farm manager, as an integral part of the sector.

RESULTS ACHIEVED Using data from telephone surveys and interviews conducted with producer groups and agricultural organizations, Garven & Associates Ltd., a Saskatoon-based management consulting, firm formulated a number of recommendations. This needs assessment advocated the following:

- offer introductory Internet training for farm managers;
- develop specialized computer and Internet training courses;
- adapt existing computer and internet training programs in order to customize programs for commodity specific groups;
- target training development to the most receptive learners within the farm community;
- develop distance delivered IT training;
- provide appropriate sources of follow-up and support for farm managers taking IT training;
- provide the use of IT as a management tool;
- develop workshops for producer groups, agricultural boards and group administrators to promote better use of IT within their organizations; and,
- consider an allocation of 'special project funding' for projects that are managed and administered by producer groups and agricultural organizations and designed to benefit large groups of farm managers.

KEY CONTACT Brenda Stefanson, Agricultural Institute of Management in Saskatchewan,
(306) 975-8927.
E-mail: stefanson@sccd.sk.ca

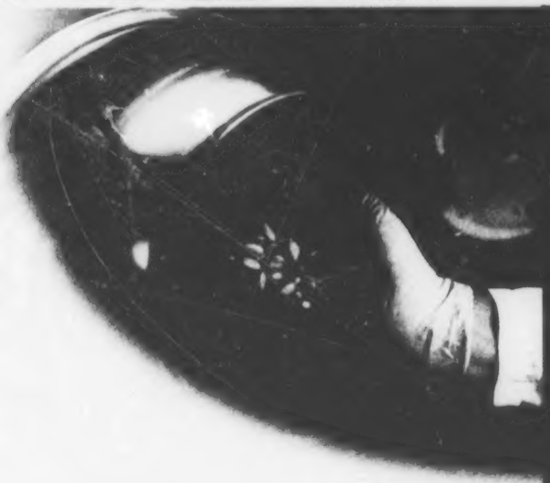
TECHNICAL TITLE AIMS – Information Technology Educational Needs Assessment

Refer to Project Number: 19970098 v.:1.2 w237

Non-Food Processing

AGRI-FOOD INNOVATION FUND

Canadä Saskatchewan



Project Focus.

79 Partnering to Promote Non-Food Reduced R&D Costs
80 Creating a Crops Processing Development Centre
81 Building a Lab for Non-food Processing
82 Upgrading an AAFC Research Lab Facility
83 Enhancing Research, Technology and Development
84 Purchase of Pilot-Scale Equipment

PROJECT FOCUS: Partnering to Promote Non-Food Reduced R&D Costs

AFIF FUNDING $2,000,000 approved. Project completion date: 31 March 2002.

OVERVIEW A Memorandum of Understanding (MOU) was signed between AFIF and the National Research Council's (NRC) Industrial Research Assistance Program (IRAP) in this umbrella Project aimed at reducing research and development (R&D) costs in a newly-established Non-Food Processing Program.

As a vehicle for encouraging industry to research and develop non-food agricultural products in Saskatchewan, six priority areas were identified: agro-fibres, specialty oils, therapeutics, renewable energies, feeds, and, agricultural waste utilization.

RESULTS ACHIEVED AFIF assistance is being used to augment the R&D Project in the areas of test marketing, project management, travel, material purchases, materials transportation and pilot project capital costs.

A variety of non-food R&D projects are being carried out in areas of:

- flax fibre usage;
- crop and animal component extraction and processing;
- market feasibility studies;
- business Intelligence;
- specialty feed development;
- technical assistance by external sources, consultant or subcontractor; and,
- improvements in equipment design and process.

KEY CONTACT Paul Gebhardt, NRC – IRAP, (306) 790-4035
E-mail: paul.gebhardt@nrc.ca

TECHNICAL TITLE IRAP/NRC Memorandum of Understanding

Refer to Project Number: 19970015 v.:1.3 w188

PROJECT FOCUS: Creating a Crops Processing Development Centre

AFIF FUNDING

$1,400,000 approved. Project completion date: 7 March 2001.

OVERVIEW

The Project centred on upgrading, construction and equipping of facilities that provided the Prairie Agricultural Machinery Institute (PAMI) with the ability for dirty products processing types of projects and other projects requiring infrastructure to be built into the facility.

AFIF supplied funds for:

- building construction;
- support equipment;
- processing equipment and accessories;
- fabrication equipment;
- an upgrade to the Environmental Chamber; and,
- data acquisition equipment.

RESULTS ACHIEVED

The Crops Processing Development Centre (CPDC) was built at PAMI's Humboldt, Sask., station. It is comprised of a 21.34 metre by 35.05 metre (70 foot x 115 foot) heated test building and an attached 21.34 metre by 21.34 metre (70 foot x 70 foot) unheated area for crop materials and equipment storage.

The CPDC's focus is in maximizing the utilization of crop materials for feed, fibre and fuel use. Among project being pursued by the new facility are crop material harvesting and collection; crop residue collection; crop material transportation; primary feed processing; development of straw collection machinery; in-field fibre separation; development of harvesting methods for oilseeds; and, efficient methods to sort fibre.

The CPDC gives a critical advantage to Saskatchewan's processing companies in providing a secure, fully equipped, working-plant environment to carry out applied research on experimental work, or to produce product runs for market test purposes. PAMI predicts its facility will indirectly create $84-milllion in sales and 350 jobs for industries during a seven year period.

KEY CONTACT

David Gullacher, PAMI, (306) 682-2555.
E-mail: dgullacher@pami.ca

TECHNICAL TITLE

Crops Processing Development Centre: Facility Upgrades to Enable Development and Piloting of Medium to Large Scale Non-Food (Feed and Agro) Fibre

Refer to Project Number: 19960308 v.:1.3 w289

PROJECT FOCUS: Building a Lab for Non-food Processing

AFIF FUNDING

$1,100,000 approved. Project completion date: 31 October 2001.

OVERVIEW

AFIF supplied funds for a major renovation and upgrade resulting in a high-quality laboratory and project space for Ag-Bioprocessing research work associated with the Department of Agricultural and Bioresource engineering.

RESULTS ACHIEVED

Construction of the facility allows for consolidation of ag-bioprocessing research that was being done at various locations on the university campus. The facility provides the state of the art in equipment and space to conduct focused research on added value processing of agricultural and biotechnology products. Increased security, including the ability to segregate and secure confidential work, will make the facility more safe and efficient in terms of personnel, instruments and equipment. Space is also provided to enhance technology transfer and outreach activities.

Ample electrical, lab air, lab vacuum, steam, deionized water, natural gas, dust control, and halogen lighting will make a significant contribution to a safe, efficient operation in a user-friendly environment. The Lab will be more identifiable and accessible for clients and visitors.

A number of research projects are already in progress in such areas as baled forage, marine feeds, herb drying and storage, flax straw, field peas and fibre processing.

KEY CONTACT

Dr. Charles Maulé, University of Saskatchewan, (306) 966-5306.
E-mail: charles.maule@usask.ca

TECHNICAL TITLE

Enhancement of a Bioprocess Engineering Laboratory in the College of Engineering, University of Saskatchewan

PROJECT FOCUS: Upgrading an AAFC Research Lab Facility

AFIF FUNDING

$800,000 approved. Project completion date: 25 February 1999.

OVERVIEW

The Project involved a facilities and equipment upgrade at the Crop Utilization Research Section in the Saskatoon Research Centre. The Crop Utilization Research Centre conducts research and development activities within the mandate of the Agriculture and Agri-Food Canada program – Crop Products and Processes.

The upgrade enhanced the research section's ability to:

- develop new processing technology that improves the quality of processed crop products and enhances the efficiency and effectiveness of processing systems needed to develop and characterize new ingredients; and,
- develop new and improved products and processes for both food and non-food uses that will lead to the improved value of crops grown in Western Canada.

RESULTS ACHIEVED

As well as the upgrade to the 929 square metre (10,000 square foot) laboratory facility where 16 scientific and technical staff work, lab equipment was also purchased that allows for:

- the isolation of discrete fractions of high purity in multi-gram-to-kilogram quantity;
- precise flow measurements of fluids, including gels and pastes;
- a digital electronics console for the existing Nuclear Magnetic Resonance (NMR) spectrometer; and,
- identification of plant compounds using an electro-spray spectrometer.

KEY CONTACT

Neil Westcott, Agriculture and Agri-Food Canada, (306) 956-7200.
E-mail: westcottn@em.agr.ca

TECHNICAL TITLE

Upgrades of Facilities: Equipment and Human Resources

PROJECT FOCUS: Enhancing Research, Technology and Development

AFIF FUNDING

$600,000 approved. Project completion date: 15 November 2001.

OVERVIEW

Working with a number of existing feedstuff operations in Saskatchewan, the Project is focusing on increasing research, technology and development in the long term. Partners in the Project include the University of Saskatchewan, particularly the Department of Animal and Poultry Sciences; a number of feed ingredient producers and processors; other research groups; and, the some federal and provincial agencies.

RESULTS ACHIEVED

The Project has been operating for three years and a number of pilot plants have been established in the areas of:

- developing superior crop varieties for feeds;
- developing aquaculture feeds;
- developing a unique hull-less variety of barley and a unique feed oat, the latter of which offers increased digestibility and energy;
- enhancing feedstuff evaluation through chemical analysis, in-vitro techniques and computer modeling;
- developing superior feed crops in conjunction with plant breeders; and,
- developing research involving milling byproducts, grain screenings, canola meal, field peas, wheat and forage products.

Five new feed sources are being sold commercially under different trade names and three other feed sources are in development.

Infrastructure and relationships continue to be developed. A Web site has been developed at www.feedresources.com

Specialized training courses, teaching assignments and seminars have also been undertaken.

KEY CONTACT

Vern Racz, Executive Director, Prairie Feed Resource Centre, (306) 966-5622.
E-mail: feedresources@sask.usask.ca

TECHNICAL TITLE

Innovation and Commercialization of Saskatchewan Feedstuffs: Provisions of Infrastructure to Enhance the Value and Utilization of Feedstuffs.

Refer to Project Number: 19960305 v.:1.3 w251

PROJECT FOCUS: Purchase of Pilot-Scale Equipment

AFIF FUNDING	$115,000 approved. Project completion date: 13 October 1999.
OVERVIEW	The Project was a request for funding for two pieces of pilot-scale equipment to be housed at the POS Pilot Plant in Saskatoon. AFIF funding was approved for the purchase of one piece of equipment.
RESULTS ACHIEVED	An ultrafiltration unit was purchased. This unit removes impurities and concentrates desirable components in liquids. Ultrafiltration can by used by POS to develop processes for the following: • food proteins; • nutraceutical products; • cosmetic ingredients; • food oils, and, • recovery of biotech products.
KEY CONTACT	Paul Fedec, POS Pilot Plant Corporation, (306) 978-2800. E-mail: paulf@pos.ca
TECHNICAL TITLE	Application for Funding to Purchase a Pilot-Scale Ultrafiltration Unit and a Pilot-Scale Freeze Dryer *(Note: Freeze dryer was neither funded nor purchased)*

Specialized *Crops*

AGRI-FOOD
INNOVATION
FUND

Canadä Saskatchewan

Project *Focus.*

87 Establishing Sites for Research and Demonstration
88 Special Crops Breeding: Building Hardier Crops
89 Identifying Molecular Markers in Flax/Solin
90 Developing New and Improved Oilseed Varieties
91 Disease Management in Pulse Crops
92 Developing Oilseed Crops for the Dry Prairies
93 Spice Breeding and Agronomic Research
94 Setting Quality Standards for Pulse and Spice Crops
95 Developing Canary Seed for Human Consumption
96 Cross-Breeding Varieties of Oriental Mustard
97 A New Seed Cleaning Facility for Pulse Crops
98 Managing Alfalfa Leafcutting Bee Populations
99 Researching Alternative Forage Grass and Cultivars
100 Development of Disease Resistant Lentils
101 Controlling Parasitic Mites in Honey Bee Colonies
102 Using Organic Oils to Combat Fee Bee Colony Pests
103 Advances in Growing Medicinal Herbs
104 Controlling Mite Infestations in Honey Bee Colonies
105 Over-Wintering Strategies for Controlling Bee Mites
106 Controlling Disease and Parasites in Honey Bees
107 Effects of Mites on Honey Bee Colonies

PROJECT FOCUS: Establishing Sites for Research and Demonstration

AFIF FUNDING

$4,675,750 approved. Project completion date: 31 March 2002.

OVERVIEW

The Project's focus is to establish joint industry-government applied research and demonstration programs at eight sites within the province. These Spoke sites are linked to Agriculture and Agri-Food Canada research experimental farms and the Canada-Saskatchewan Irrigation Diversification Centre (CSIDC) to find solutions to agronomic and crop protection problems. Specialized crop production technology will be demonstrated to local producers.

Partners in the Project included Agriculture and Agri-Food Canada; Saskatchewan Agriculture and Food; Saskatchewan Pulse Growers Association; Saskatchewan Organic Directorate; Saskatchewan Herb and Spice Association; Saskatchewan Beekeepers Association; Saskatchewan Alfalfa Seed Producers Association; Saskatchewan Forage Council; Saskatchewan Sunflower Committee, and, numerous ag-industry supporters.

RESULTS ACHIEVED

At the operational Spoke sites, more than 21 station years of research have been completed. A broad cross-section of research and development is being undertaken in areas of:

- development of agronomic packages for the production of organically grown crops, pulse, herb and spice, new turf and forage grasses;
- obtaining minor use registration of herbicides of special crops;
- development of a network of regional testing sites for sunflower, dry beans and chickpeas;
- development of management packages for weed, disease and insect control in alfalfa seed production;
- assessment of the use of leafcutting and honey bee pollinators on specialized and traditional crops; and,
- development of a long-term strategy for the Spoke sites beyond the life of the AFIF Project.

KEY CONTACT

Guy Lafond, Agriculture and Agri-Food Canada, (306) 695-5220.
E-mail: lafond@em.agr.ca

TECHNICAL TITLE

Spoke Applied Research and Demonstration

Refer to Project Number: 19960513 v.:1.1 w264

PROJECT FOCUS: Special Crops Breeding: Building Hardier Crops

AFIF FUNDING $2,600,000 approved. Project Status: Endowment.

OVERVIEW

AFIF provided the Project funds for the development of high-yielding bean and chickpea cultivars with increased disease resistance, climatic adaptation, earliness, cold tolerance and improved harvestability. More commercial viability should be realized by developing more Saskatchewan-climate-adapted varieties of bean and chickpeas.

There were two University of Saskatchewan Crop Development Centre (CDC) research partners on the Project: Dr. Albert Vandeberg and Dr. Tom Warkentin.

RESULTS ACHIEVED

Seven new chickpea varieties have been released through Saskatchewan Pulse Growers to Select Growers in Saskatchewan. All varieties have some level of resistance to ascochyta blight, while most also show greater yields, disease resistance and marketability.

Significant expansion of chickpea production continues and new varieties are contributing to more economic activity and productivity in the pulse crop sector.

Three dry bean varieties were also released through Saskatchewan Pulse Growers. Release of these new varieties has generated interest in dry bean production.

Value of this Project's results to date is estimated at more than $50-million in economic activity in the pulse seed and export sectors.

Research results, which have been widely distributed and sparked much interest, have been partially responsible for generating additional research grants from a number of sources

KEY CONTACT

Dr. Rick Holm, CDC, University of Saskatchewan, (306) 966-5006.
E-mail: holm@usask.ca

TECHNICAL TITLE (Endowment) Special Crops Breeding: With the Main Emphasis on Pulse Crops, Especially Dry Bean and Chickpea

Refer to Project Number: 19960312 v.:1.1 w241

PROJECT FOCUS: Identifying Molecular Markers in Flax/Solin

AFIF FUNDING

$840,000 approved. Project completion date: 1 May 2001.

OVERVIEW

In Western Canada, flax has traditionally been grown as an industrial oilseed crop. The recent development of solin (low linolenic acid) flax varieties is expected to result in increased acreage seeded to flax for the human consumption vegetable oil market. At present there are only two registered solin varieties.

Molecular markers that can identify key traits necessary for new solin varieties (yellow seed, low linolenic acid, wilt resistance, yield, etc.) will reduce both time and resources needed for new variety development.

A major component of the Project is to develop molecular marker methodologies, which can be used in flax/solin, and identify molecular markers for yellow seed coat, linolenic acid content and wilt resistance. A secondary Project component will be the production of transgenic flax lines with altered fatty acid composition.

RESULTS ACHIEVED

Solin breeding has resulted in the identification of soil germplasm with superior wilt resistance. As well, technology to develop markers in solin has been developed.

Solin plants with elevated oleic and stearic acid have also been identified. Work is continuing to develop these lines and further enhance the accumulation of these fatty acids.

The research work has also resulted in a reliable, cost effective assay for measuring Cyanogenic Glucoside content in the EMS flax population.

KEY CONTACT

Dr. Gordon Rowland, University of Saskatchewan, Crop Development Centre (CDC), (306) 966-4977.

E-mail: rowland@sask.usask.ca

TECHNICAL TITLE

Accelerated Development of Varieties in Solin

Refer to Project Number: 19960272 v.:1.2 w249

PROJECT FOCUS: Developing New and Improved Oilseed Varieties

AFIF FUNDING	$660,000 approved. Project completion date: 31 March 2002.
OVERVIEW	The main component of this Project is to accelerate the development of the *Brassica juncea* oilseed strain into a high-yielding, canola-quality variety with white rust resistance and improved seed quality. The latter will be achieved by increasing seed oil content, modifying the fatty acid profile and further reducing glucosinolate content. The Project will also develop a large suite of molecular markets for several traits surrounding the continued enhancement, through genetic manipulation, of *Brassica juncea*.
RESULTS ACHIEVED	Two markers have been identified that are linked to rust resistant strains. Genes suspected to have oil synthesis characteristics have been cloned. Research continues in identifying fatty acid traits through marker assisted backcross breeding. Research from the Project was presented to the 10th International Rapeseed Congress in Canberra, Australia in the fall 1999.
KEY CONTACT	Dr. J. P. Raney, Agriculture and Agri-Food Canada, (306) 956-7236. E-mail: raneyj@em.agr.ca
TECHNICAL TITLE	Enhancement of *Brassica Juncea* Canola Breeding Through Marker-Assisted Selection

PROJECT FOCUS: Disease Management in Pulse Crops

AFIF FUNDING

$600,000 approved. Project completion date: 13 December 2000.

OVERVIEW

Pulse crop production across the Prairies has risen significantly during the past two decades. In Saskatchewan, the value of pea lentil, chickpea and bean production has reached the $500-million mark. This Project keyed on three areas of disease control in chickpeas, lentils, and filed peas that included:

- development of a decision support system for fungicidal control of ascochyta blight and anthracnose of lentil, and mycosphaerella blight of pea, and make the system available to producers;
- development of a cost-effective package of recommendations for control of ascochyta blight of chickpea; and,
- identify races of Ascochyta rabiei in North America.

RESULTS ACHIEVED

One of the main challenges of the Project was to distill the 3-plus years of research data from sophisticated analytic techniques - including geographic information systems (GIS) – into a simple set of recommendations that growers could apply to their particular situation.

A number of research co-operators from the Prairies were involved in the large, ambitious study that strengthened the pulse disease network in Western Canada. Single, annual reports were compiled and provided to all funding agencies, thus reducing the time individual researchers needed to spend on reporting progress. A number of field trials, disease surveys and demonstrations were conducted using the pulse crops, with recommendations being drafted for each crop.

KEY CONTACT

Dr. Bruce Gossen, Agriculture and Agri-Food Canada, (306) 956-7200.
E-mail: gossenb.@em.agr.ca

TECHNICAL TITLE

Integrated Disease Management for Chickpea, Lentil and Field Pea

PROJECT FOCUS: Developing Oilseed Crops for the Dry Prairies

AFIF FUNDING

$480,000 approved. Project completion date: 31 March 2002.

OVERVIEW

The Project centred on two areas of oilseed research for developing:

- high-yielding, high oil content, canola-quality oilseed strains of the *Sinapis alba* variety; and,
- high-yielding, high protein content canola-quality strains of *Sinapis alba* as a source of high quality animal feed and for possible human consumption.

Preliminary research indicates a heat and drought-tolerant oilseed crop would provide a high value crop alternative to farmers in the semi-arid Prairies. It would also generate income for crop and seed producers, processors and exporters of oilseed producers. High protein *Sinapis alba* would also furnish good quality feed for livestock producers, as well as reducing feeding costs.

RESULTS ACHIEVED

High quality strains of the oilseed have been developed and continue to be evaluated. Germplasm evaluation points to valuable genetic variability for continued *Sinapis alba* cultivar development.

Molecular markers for erucic acid have been developed for marker-assisted breeding. Recurrent selection for increased protein content continues to be effective.

KEY CONTACT

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Dr. Felicitas Katepa-Mupondwa, Agriculture and Agri-Food Canada, (306) 956-7691.

TECHNICAL TITLE

Canola-Quality Oilseed *Sinapis Alba* will be Developed into an Oilseed Crop for the Dryland Prairie

PROJECT FOCUS: Spice Breeding and Agronomic Research

AFIF FUNDING $440,000 approved. Project completion date: 2 January 2002.

OVERVIEW The United States market for spices and herbs now exceeds $400-million annually and is projected to grow by five per cent each year. Market growth is based on growth of high fibre, low fat, low cholesterol, low sodium and sugar-free processed foods. The trend is toward development of complex blends of spices and flavorings to compensate for the use of fat substitutes and high fibre ingredients in baked goods, snacks and modified dairy products. Stability of flavors is needed for microwave cooking and the maintenance of spicy flavors in extruded snacks cereals, frozen foods and dry beverage mixes.

The Project has three objectives:

- development of high yielding, high quality cultivars of coriander, annual caraway, anise, dill and fenugreek;
- development of a package of agronomic practices for the production of economic yields of these improved spice cultivars; and,
- demonstration of the most promising cultivars and agronomic practices for some of these spice crops at some of the specialized "spoke" sites.

RESULTS ACHIEVED Almost two-thirds of the U.S. requirements for spices and flavorings are imported from countries where quality standards are almost non-existent. It is important for Saskatchewan to establish a package of agronomic practices for spice crops so that producers and consistently produce economic yields of high quality cultivars.

Advanced selections of dill are being yield tested and the best lines from the better population will be bulked for Breeder seed of a new variety in 2002.

Following yield tests on selections of coriander in 2001, a high essential oil line of coriander could be released in 2002 or 2003.
Other field trials and data gathering are continuing.

KEY CONTACT Dr. Al Slinkard, University of Saskatchewan, Crop Development Centre,
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TECHNICAL TITLE Spice Breeding and Agronomic Research

PROJECT FOCUS: Setting Quality Standards for Pulse and Spice Crops

AFIF FUNDING	$400,000 approved. Project completion date: 31 March 2002.

OVERVIEW

Special crop production in Saskatchewan has increased to more than three million acres today from about 50,000 acres in 1970. Major special crops are pulses, canaryseed, mustard and spice crops. Research has been relatively limited in aspects of quality. Quality in pulses is based largely on visual appearance, cooking time and canning quality. In spices, quality is again based on appearance, aroma, fixed and essential oil concentrations and the essential oil profile.

This Project is made up of five objectives:

- develop/adapt cooking and canning quality evaluation methodologies for pea, bean, lentil and chickpea;
- evaluate the cooking and canning quality of pulse crops in support of the pulse crop breeding program;
- develop bleaching evaluation techniques for red and green cotyledon pulse cultivars;
- develop nutritional profiles of Saskatchewan-grown pulse crops; and,
- evaluate the quantity and quality of essential oil and fixed oil in adapted and high quality spices generated by cultivar selection and plant breeding.

RESULTS ACHIEVED

The Project's impact will be measured by the number of new cultivars of spice and pulse crops released and made available to Saskatchewan farmers.

Four years of data - including nutritional profiles - will be available and a standardized approach to quality assessment for pulse and spice crops will be in place at the conclusion of the project.

KEY CONTACT

Dr. Robert Tyler, Crop Development Centre, University of Saskatchewan, 966-05024.
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TECHNICAL TITLE

Quality Evaluation and Research in Support of Spice and Pulse Crop Breeding Projects

PROJECT FOCUS: Developing Canary Seed for Human Consumption

AFIF FUNDING $370,000 approved. Project completion date: 10 May 2001.

OVERVIEW

Canary seed or annual canary grass has become a major alternate crop in Western Canada, particularly in Saskatchewan that accounts for more than 90% of Canadian canary seed production. It is a cereal crop that has only one use – bird food mixtures.

The value of annual Canadian exports is averaging more than $50-million annually. Dehulled canary seed or canary seed groat was found to contain acceptable levels of starch, protein and oil with unique properties for each component that has potential in the food and non-food industries.

The Project was aimed at developing canary seed cultivars suitable for human consumption and adapted to Saskatchewan growing conditions. Glabrous cultivars with improved resistance to Septoria leaf mottle were a major breeding objective.

RESULTS ACHIEVED

Current commercial canary seed cultivars are not suited for human consumption and processing because their hulls are covered with small, silicified hairs or spicules that can contaminate the groat during dehulling. These tiny hairs in canary seed production cause irritation for combine operators and grain handlers. They may also have carcinogenic qualities.

CDC Maria was the first hairless ("itchless") cultivar registered in 1997. During the Project's course, it was evaluated and showed potential for use in food and non-food products.

CDC Maria canary seed flour exhibited dough-forming characteristic, allowing for blending with wheat.

The first glabrous canary seed lines from planned crosses were yield-tested at various sites. A number of elite lines were retested in 2000. The most promising lines were 9%-to-14% higher yields than CDC Maria with improvements in leaf mottle reaction.

KEY CONTACT Dr. Pierre Hucl, University of Saskatchewan, (306) 966-8667.
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TECHNICAL TITLE Development and Quality of Glabrous Canary Seed

Refer to Project Number: 19960287 v.:1.2 w295

PROJECT FOCUS: Cross-Breeding Varieties of Oriental Mustard

AFIF FUNDING $304,000 approved. Project completion date: 13 December 2000.

OVERVIEW The Project's thrusts were:

- to develop a line of zero erucic acid oriental mustard (ZEM) with agronomic traits competitive with that of standard oriental mustard varieties; and,
- to develop a ZEM containing oil with an improved fatty acid profile (similar to that of canola oil standards) that would increase the oil's marketability as an edible oil product.

RESULTS ACHIEVED Several ZEM lines have been monitored in replicated field trials. One line was entered in the Western Canada Co-operative Mustard Trial. Other lines are being advanced into yield trials.

Progeny from a high oleic acid ZEM line have met minimum canola oil standards.

Research is continuing on ZEM lines' resistance to white rust.

KEY CONTACT Dr. J. P. Raney, Agriculture and Agri-Food Canada, (306) 956-7236.

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TECHNICAL TITLE Development of Zero Erucic Oriental Mustard

Refer to Project Number: 19960428 v.:1.2 w154

PROJECT FOCUS: A New Seed Cleaning Facility for Pulse Crops

AFIF FUNDING $225,000 approved. Project completion date: 24 April 2001.

OVERVIEW AFIF provided partial funding for specialized seed cleaning equipment for the University of Saskatchewan Crop Development Centre's (CDC) 929 square metre (10,000 square foot) facility on the Kernen Crop Research Farm, east of Saskatoon.

RESULTS ACHIEVED The building has been operational since 2000. The state-of-the-art seed cleaning plant valued at $450,000 was cost-shared by AFIF and the Saskatchewan Pulse Growers.

Among the plant's activities is cleaning the CDC's Breeder Seed that is shipped to select seed growers and seed companies on a fee-for-service basis.

The pulse crop industry will benefit most from the new facility due to the addition of the color sorter – one of three in Western Canada - and new equipment that causes less damage to the seed during cleaning.

A major improvement to the facility was the implementation of an air filtration system that has greatly reduced the dust in the cleaning area. In addition, this system filters the pre-heated air, and returns it into the building, thus reducing the heating costs of the plant.

KEY CONTACT Garth Patterson, Executive Director, Saskatchewan Pulse Growers, (306) 668-5556.
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TECHNICAL TITLE Specialized Pulse Breeder Seed Cleaning and Handling Equipment/Facility

PROJECT FOCUS: Managing Alfalfa Leafcutting Bee Populations

AFIF FUNDING $207,000 approved. Project completion date: 6 June 2001.

OVERVIEW

Alfalfa leafcutting bee sales in Saskatchewan have grown into a $10-million to $15-million industry that is reliant on maintaining a bee population free of parasites and disease.

AFIF supplied funds to monitor the quality of alfalfa leafcutting bee populations and for development of parasite, predator and disease management strategies.

Production of alfalfa seed, a key component in this province's diversified agricultural economy, is dependent upon healthy populations of a small, solitary insect - the alfalfa leafcutting bee. Under ideal conditions, this bee population doubles each year, with excess production marketed primarily to alfalfa seed growers in the United States.

Partners in the Project were the Saskatchewan Alfalfa Seed Producers Association and the Saskatchewan Alfalfa Seed Producers Development Commission.

RESULTS ACHIEVED

A number of results were realized during the Project's lifecycle, including:

- successful field-scale testing of two alternative compounds for parasite control;
- development of a prototype alfalfa leafcutting bee incubator designed to increase parasite and disease control capability;
- identification of stored product pests and insect predators of economic importance in alfalfa leafcutting bee populations; and,
- identification of areas in Saskatchewan where alfalfa leafcutting bee populations are most at risk.

KEY CONTACT

Wayne Goerzen, Saskatchewan Alfalfa Seed Producers Association, (306) 956-7275.
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TECHNICAL TITLE Parasite, Predator and Disease Management Strategies in Alfalfa Leafcutting Bees

PROJECT FOCUS: Researching Alternative Forage Grass and Cultivars

AFIF FUNDING

$175,000 approved. Project completion date: 13 December 2000.

OVERVIEW

The introduction of new ryegrass species/cultivars and further development of traditional grass species like crested wheatgrass and bromegrasses, will provide forage and seed producers with additional cropping choices in their farming programs.

The development of cultivars/species that could extend the grazing season in summer and late-fall/early-winter could also reduce costs of beef production.

Two researchers from the Saskatoon Research Centre were partners in the Project.

RESULTS ACHIEVED

Exceptionally high dry matter yields from the ryegrasses were found in the field trials.

Three westerwolds and two Italian ryegrass lines, which stay green and vigorous into late fall, were selected for evaluation.

Vigorous plants from new crosses between smooth and meadow bromegrasses were selected for forage and seed production in nurseries. Performance trials were conducted and evaluated.

Progenies of crosses between high-yielding crested wheatgrass lines were also evaluated. Several promising lines were identified for their higher yield and lower fibre characteristics. Selected plants were interpollinated in the greenhouse.

KEY CONTACT

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TECHNICAL TITLE

Introduction and Development of Alternative Forage Grass Species and Cultivars

Refer to Project Number: 19960288 v.:1.2 w200

PROJECT FOCUS: Development of Disease Resistant Lentils

AFIF FUNDING $160,000 approved. Project completion date: 26 July 2000.

OVERVIEW The Project's main thrust was to accelerate development and breeder-seed increase of a disease resistant, Eston-type of lentil by 1998, and a disease resistant, Laird-type lentil by 2000.

The plan called for the rapid increase and distribution of a breeder-seed suite of lentil varieties with improved resistance to ascochyta blight. This would improve the level of stability of yield and improve the quality of lentils produced in Saskatchewan.

There were two other research partners in the Project, Dr. Tom Warkentin and Dr. Al Slinkard, both of the CDC.

RESULTS ACHIEVED To June 2000, breeder-seed of seven new lentil varieties was released through Saskatchewan Pulse Growers to Select Seed Growers in the province. This accelerated the replacement of obsolete varieties and expanded the range of market classes of lentils in Saskatchewan.

Release of the new varieties has:

- created economic opportunities for pulse exporters and seed producers;
- reduced the cost production; and,
- expanded market share for Saskatchewan pulse growers.

Economic value of these results in estimated to represent production savings and increased opportunities of tens of millions of dollars to the province's economy.

Research results, which have been widely distributed and sparked much interest, have been partially responsible for generating additional research grants from a number of sources.

KEY CONTACT Dr. Albert Vandenberg, Crop Development Centre (CDC), University of Saskatchewan, (306) 966-8786.
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TECHNICAL TITLE Accelerated Development of Disease Resistant Lentil

PROJECT FOCUS: Controlling Parasitic Mites in Honey Bee Colonies

AFIF FUNDING

$75,000 approved. Project completion date: 30 April 2001.

OVERVIEW

The objectives of this research Project were:

- to determine optimal doses of formic acid required to control the varroa mite under the wide range of Prairie environmental conditions;
- to determine lethal and sublethal doses of formic acid for worker and queen bees under a variety of environmental conditions;
- to assess the effectiveness of different application release rates, timing of application and method of application to control the verroa mite; and,
- to assess the effectiveness of different application release rates, timing of application and method of application on colony performance and honey production.

RESULTS ACHIEVED

Field experiments indicated the type of chemical compound formulation applied might affect colony performance.

The dose and release rates required to achieve effective mite control in over-Wintered colonies and Spring-treated colonies is being analyzed. Doses that effectively control mites while not being harmful to bees, have been quantified.

In-progress study results are being distributed periodically to industry stakeholders.

KEY CONTACT

Dr. Robert Currie, University of Manitoba, (204) 474-6022.
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TECHNICAL TITLE

Control of Parasitic Mites in Honey Bees

Refer to Project Number: 19970003 v.:1.1 w197

PROJECT FOCUS: Using Organic Oils to Combat Bee Colony Pests

AFIF FUNDING

$75,000 approved. Project completion date: 26 June 2000.

OVERVIEW

Two parasitic mites, varroa *Varroa jacobsoni* and tracheal *Acarapis woodi*, and two infectious microbial diseases, the bacteria *Bacillus larvae*, and the fungus *Ascophaera apis*, represent key pests of honey bees in Saskatchewan and around the world. Current control of three of these pests in commercial colonies is dependent on only one or two control agents, leaving beekeepers vulnerable to the evolution of pesticide and antibiotic resistance.

The Project keyed on the possibility of seed extracts from the Asian neem tree being used to combat these major threats to honey bee colonies.
Research was four-pronged and involved:

- assessment of the acute toxicity of neem extracts to various honey bee pests;
- determining safe dosage of neem extracts in honey bee colonies without causing acute mortality or sub-lethal toxic effects to the resident bees;
- ascertaining the most effective application of the extract to target honey bee pests; and,
- developing application technologies and management systems to control the pests with neem products.

RESULTS ACHIEVED

Beekeeping and its subsequent pollination service are valued at more than $20-billion (Cdn) in North America alone.

The study's most important finding was that neem oil has potential to control varroa and tracheal mites, and the bacterial brood disease American Foul Brood. However, the neem extract does not combat the fungal parasite, chalkbrood.

The study developed a unique rapid bioassay screening system to evaluate new potential miticides, including neem and other essential oils.

Field evaluation of neem and canola oil suggested that neem sprayed on bees during summer could be effective in varroa and tracheal mite control.

KEY CONTACT

Mark Winston, Simon Fraser University, (604) 291-4459.
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TECHNICAL TITLE

Using Neem Extracts to Control Pests of the Honey Bee

Refer to Project Number: 19960438 v.:1.1 w305

PROJECT FOCUS: Advances in Growing Medicinal Herbs

AFIF FUNDING $60,000 approved. Project completion date: 13 March 2002.

OVERVIEW The Project centres on three research areas:

- maintaining medicinal herb demonstration sites that allow growers to observe the growth, survival and harvest of selected plants;
- gathering data on adaptability, production problems, processing and marketability of herbs grown; and,
- reducing the pressure on wildcrafted plants by assessing their potential for cultivation.

Partners in the Project are the Saskatchewan Herb and Spice Association; NorSask Botanicals; and, Saskatchewan Agriculture and Food's Herb Research Program.

RESULTS ACHIEVED Producers have gained valuable knowledge by touring the various grow sites and being able to speak with industry professionals. Sites are in high profile locations and allow producers to observe various stages of plant development throughout the growing seasons. As well as the opportunities for networking, producers can obtain information on successes and common problems, such as weed control and irrigation options.

Various quality assurance data has been accumulated on various herbal species.

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TECHNICAL TITLE Medicinal Herbs

Refer to Project Number: 19970402 v.:1.2 w181

PROJECT FOCUS: Controlling Mite Infestations in Honey Bee Colonies

AFIF FUNDING

$60,000 approved. Project completion date: 27 June 2000.

OVERVIEW

Parasitic mites present the greatest economic threat to beekeeping in North America today. In particular, two mites – the honey bee tracheal mite and the varroa mite – pose a major threat to this $20-billion (Cdn) industry.

Tracheal mites infest adult bees, living their entire lives within the tracheal tubes of the bees. They only leave the trachea to transfer to the next host.

Varroa mites have two lifecycle hosts, beginning with the female varroa entering a cell just before it is sealed to feed on the larvae as it pupates. The female and her offspring emerge with the bee and spend some time on the adult bee before returning to a cell.

Both mites can be fatal to bee colonies by reducing honey and brood production and increasing winter bee and colony mortality.

The Project focused on dual mite infestations of honey bee colonies by addressing three questions:

- How does colony mortality vary with single and dual infestations?
- How do tracheal and varroa mites affect colony production of adult bees, brood and storage of honey and pollen?
- Can management tools be developed to treat both mites simultaneously?

RESULTS ACHIEVED

The most important finding of the Project was that dual infestations are considerably worse than infestations of tracheal and varroa mites alone.

The proportion of pollen collection was not different from colonies with single or dual infestations. However, bees parasitized by both mites had significantly smaller pollen loads than uninfested bees.

Various neem and botanical oil treatments showed potential for controlling both mites.

The Project's overall results have been outlined to beekeeping audiences and in scientific publications.

KEY CONTACT

Mark Winston, Simon Fraser University, (604) 291-4459.
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TECHNICAL TITLE

Integrated Host Management: The Effect of Dual Mite Infestation of a Honey Bee Colony

PROJECT FOCUS: Over-Wintering Strategies for Controlling Bee Mites

AFIF FUNDING

$50,000 approved. Project completion date: 30 April 2001.

OVERVIEW

The Project's research was done in four areas:

- monitoring the release levels of fluvalinate (in this case the commercial product Apistan®) from strips (containing the chemical) if they are left in over wintered bee colonies on the Prairies;
- assessing the impact of this strip-based application method on residues in honey and wax;
- determining the effectiveness of treatment and estimate the potential selection pressures on mites; and,
- estimating the long-term exposure on bee colony performance.

RESULTS ACHIEVED

Colonies were treated with fluvalinate under indoor and outdoor wintering management systems. These colonies were sampled for varroa and tracheal mites in Spring 2000 and assessed for colony loss, queen bee loss and queen bee performance.

Comb samples were tested for fluvalinate levels residues and bee samples were studied to assess the impact on mites.

Preliminary data analysis indicates there may be substantial benefits to leaving the chemical strips in colonies throughout the winter. The ramifications of this procedure on development of pesticide resistance in mites are being assessed.

KEY CONTACT

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TECHNICAL TITLE

Management of Varroa Mites in Honey Bees

Refer to Project Number: 19970002 v.:1.1 w209

PROJECT FOCUS: Controlling Disease and Parasites in Honey Bees

AFIF FUNDING $45,000 approved. Project completion date: 30 April 2001.

OVERVIEW The Project is investigating the effectiveness of various chemical acaricides (similar to an fungicide to control disease a or pesticide to control mites) treatments, such a formic acid, menthol and essential oils, in the control of chalkbrood - a devastating fungal disease - and *Nosema* disease in honey bees.

The intent is to study the casual relationship between acaricide treatment and reductions in diseases so beekeepers can make informed management decisions about the efficacy of chemical control products against a wide range of disease and parasites. This may allow producers to reduce acaracide use by using better disease management strategies.

RESULTS ACHIEVED Laboratory trials are under way concentrating on the disease cycle of chalkbrood fungus and what the effects are when exposed to a variety of compounds. Bee colonies treated with formic acid appear to show reduced chalkbrood levels, but nosema were not affected.

The ramifications of formic acid on diseases, bees and colony performance is being assessed to clarify whether formic acid acts directly on chalkbrood or whether it acts through reducing the mite population that carries the disease.

In-progress study results are being distributed periodically to industry stakeholders.

KEY CONTACT Dr. Robert Currie, University of Manitoba, (204) 474-6022.
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TECHNICAL TITLE Chalkbrood and Disease Control in Honey Bees

PROJECT FOCUS: Effects of Mites on Honey Bee Colonies

AFIF FUNDING

$9,000 approved. Project completion date: 24 March 1999.

OVERVIEW

AFIF commissioned Simon Fraser University to study the effect of two different treatment applications of fluvalinate (in this case the commercial product Apistan ®) on the population growth and honey production of over-wintered honeybees.

The manufacturers state that an Apistan® treatment – administered through chemical strips - should not last longer than 42 days, but many beekeepers leave the strips in the hive for a longer period. The purpose of this study was to determine whether the extended treatment period had any impact (beneficial or detrimental) to the hive or its honey production.

The parasitic Varroa jacobsoni mite has become a formidable problem for North American beekeepers and is capable of destroying entire honeybee operations. Currently, chemical acaricides (similar to an insecticide) are the only way to control an outbreak of Varroa mites. The most popular acaricide among Canadian beekeepers is fluvalinate (Apistan®), a nerve toxin that kills Varroa mites on contact. Apistan® strips have proven very effective in controlling Varroa mites and, when used according to label instructions, do no significant damage to the bees or honey.

RESULTS ACHIEVED

The study found that population growth (i.e. the number of adults, pupae and prepupae) and honey production did not vary significantly between the hives that received the recommended and extended treatments, or between the treated hives and the untreated ones that were used as a scientific control. However, the researchers warn that the small scale of the study means that its results should be interpreted with caution. Although the extended Apistan® treatment did not affect the hive's health or honey production, researchers still recommend against the extended treatment due to the risk of developing fluvalinate-resistant mites. The possibility of losing one of the most effective and rapidly acting defenses against the Varroa mite should encourage all beekeepers to follow the label instructions.

KEY CONTACT

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TECHNICAL TITLE

Sublethal Effects of Acaricides on Honey Bee Colonies

Refer to Project Number: 19960514 v.:1.2 w343

Specialized *Livestock*

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Canada Saskatchewan

Project *Focus.*

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112 Building Enhancements for Agribition
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PROJECT FOCUS: Specialized Veterinary Research Chair

AFIF FUNDING

$2,000,000 approved. Project Status: Endowment.

OVERVIEW

The Project's emphasis centres on three areas:

- To improve herd management, disease control and nutrition, thus expanding and enhancing current primary production of specialized livestock;
- To create the framework that will allow for Saskatchewan to become the leader in technological development; and,
- To provide technology transfer and extension programs to the specialized livestock industry.

Benefits accruing from this Research Chair could include lower production costs, improved herd management and veterinary expertise to the industry.

RESULTS ACHIEVED

Direct research or co-research has been done or is on-going in the following areas:

- fundamental reproduction patterns in wapiti;
- mortality and morbidity of farmed wapiti;
- effects of Canadian velvet antler on wound healing;
- seasonal fertility and the onset of puberty in male bison;
- a survey of internal parasites of farmed elk and bison;
- prospective and retrospective studies of perinatal (prior to birth and immediately following birth) mortality in farmed elk; and,
- antler removal methods for elk.

A variety of vehicles are being used to disseminate research findings including a web site called "elkmed", which has more than 150 users worldwide from the veterinary sector.

KEY CONTACT

Dr. Charles Rhodes, University of Saskatchewan, (306) 966-7068.
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TECHNICAL TITLE

(Endowment) – Specialized Livestock Veterinary Chair and Facilities at the Western College of Veterinary Medicine (WCVM)

Refer to Project Number: 19970008 v.:1.1 w233

PROJECT FOCUS: Building Enhancements for Agribition

AFIF FUNDING $2,000,000 approved. Project completion date: 16 June 1999.

OVERVIEW The Project involved developing a Specialized Livestock Centre as a practical and efficient venue for special exhibit areas and events in Agribition, which serve as a focal point and catalyst for the Specialized Livestock Industry.

RESULTS ACHIEVED As an aid to marketing and promoting the industry, three construction elements were undertaken:

- erection of Barn 4, a 396 square metre show, sale and display connection leading to Barn 8, where smaller livestock are featured;
- erection of the Stockman's Arena, a 2,880 square metre multi-purpose structure connecting four key livestock buildings and including a vet room, wash rack and office space; and,
- renovation of the 80-year-old Exhibition Stadium to a level suitable for international events.

The Project forms the basis of a joint Regina Exhibition Association-Canadian Western Agribition capital campaign to complete added elements and upgrade other Park facilities to maintain its capacity to host world class events.

KEY CONTACT Mark Allan, Canadian Western Agribition, (306) 565-0565.
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TECHNICAL TITLE Specialized Livestock Centre

PROJECT FOCUS: Support Programs for Specialized Livestock

AFIF FUNDING $320,000 approved. Project completion date: 15 March 2002.

OVERVIEW With an emphasis on expanding and enhancing current primary livestock production, the Project is researching methods to improve herd management practices, disease control and nutrition. A secondary component of the Project is provision for technology transfer and delivery of extension programs to the specialized livestock industry.

Much of the Project will involve a resource person to communicate to industry stakeholders and carry out extension programs, seminars and workshops in areas of herd management, nutrition, and disease control.

RESULTS ACHIEVED A person with academic training and practical work experience in the specialized livestock field was hired in 1997 and piloted the Project through the following:

- extensive work in Elk, Bison and White-tailed Deer, with some work in Fallow Deer and Reindeer. Preliminary work has been done developing Saskatchewan's trophy ranch industry;
- extension program work has been done in management, disease control and nutrition;
- a substantial amount of high quality informational material, such as factsheets, brochures, manuals, web site material and PowerPoint presentations, has been developed and distributed;
- industry liaison has been accomplished through producers groups, interprovincial and national meetings; and,
- provision of industry trends and production opportunities to industry-related persons, agencies and organizations.

KEY CONTACT Jacquie Gibney, Saskatchewan Agriculture and Food, (306) 787-5190.
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TECHNICAL TITLE Specialized Livestock Extension Program to Provide Support to the Specialized Livestock Industry

Refer to Project Number: 19960436 v.:1.3 w241

PROJECT FOCUS: Market Studies for Specialized Livestock Industries

AFIF FUNDING

$98,580 approved. Project completion date: 9 February 1998.

OVERVIEW

AFIF commissioned the consulting firm, PPD Technologies (Horizon) Inc., to study the potential of the Saskatchewan specialty livestock industry. The study examined the domestic consumer market, the foreign market and production, distribution, processing and organizational problems that are inhibiting the development of the industry. The study also looked at potential future directions for the industry and the most appropriate markets for Saskatchewan producers.

RESULTS ACHIEVED

The study concluded that the specialty livestock industry faces some serious challenges that, if not addressed, have the potential to be the industry's downfall.

The domestic consumer market for specialty livestock products is very small and the industry's few efforts to expand the market have been ineffective. Neither individual consumers nor the hotel-restaurant-institutional (HRI) sector have expressed much interest in specialty products (i.e. meat).

There are few export opportunities for most specialty livestock. In some cases, such as fallow deer, emu and ostrich, potential importing countries have purchased breeding stock and entered into competition with Saskatchewan producers. However, this province does have an advantage with indigenous species such as bison, white-tailed deer and elk.

Citing a number of major factors impeding the export and domestic markets, processing and distribution, input costs, and transportation, among others, the study concludes the future of specialty livestock lies in

- preparation and sale of deli meats;
- the high end ("white tablecloth") HRI market;
- domestic or American home meal replacement; and,
- hunt farms.

KEY CONTACT

Mr. Kaji Kado, PPD Technologies (Horizon) Inc., (416) 480-5862.
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TECHNICAL TITLE

Proposals to Conduct Meat Research and Analysis for the Specialized Livestock Industries: Part A, Part B

PROJECT FOCUS: Serological Tests for Specific Infections in Elk

AFIF FUNDING

$96,000 approved. Project completion date: 12 July 1999.

OVERVIEW

AFIF funded the efforts of the Centre for Animal Parasitology (CFIA) in Saskatoon to develop a blood test to detect elk infected with the tissue worm, or the meningeal worm, the latter of which attack the membrane covering the animal's brain.

The development of the provincial elk industry is being hindered by provincial and federal regulations that restrict the movement of elk in order to prevent the spread of both worms from eastern Canada to Saskatchewan and the other western provinces.

The development of a reliable test would help prevent the spread of these parasites while enabling the unrestricted movement of parasite-free farmed elk. The ability to certify Saskatchewan elk as being free of either parasite has the added advantage of increasing their dollar value in the marketplace.

RESULTS ACHIEVED

A major constraint to the development of a reliable blood test has been the lack of a good quality parasite antigen to react with the blood sample so that the worms' presence can be detected by an ELISA (enzyme-linked immunosorbent assay) test.

The researchers have identified a number of antigens that appear to be specific to the two worms. The research team is manufacturing and purifying sufficient quantities of recombinant antigens to permit the animal testing necessary to prove the effectiveness of this technique.

KEY CONTACT

Dr. Alvin Gajadjar, Centre for Animal Parasitology, (306) 975-5344.
E-mail: agajadhar@em.agr.ca

TECHNICAL TITLE

Serological Tests for Meningeal and Tissue Worm Infections in Elk

Refer to Project Number: 19970224 v.:1.2 w259

PROJECT FOCUS: New Handling Systems for Livestock Shows and Sales

AFIF FUNDING $90,000 approved. Project completion date: 4 April 2000.

OVERVIEW Growing participation from the specialized livestock sector, especially bison and elk, prompted the Canadian Western Agribition to increase the profile of these livestock shows.

AFIF supplied Project funds aimed at:

- creation of a recognized theme, special exhibit areas and events at Agribition to serve as the focal point for the emerging Specialized Livestock Industry;
- improvement of the profile and understanding of the industry among producers, investors, processors, suppliers and international buyers; and,
- co-ordination of marketing and promotion activities of various elements of the industry.

RESULTS ACHIEVED Various new handling systems were purchased for specialized livestock offering more humane, safe areas for the animals. These new systems also allow for the animals to be shown to their best advantage.

Décor and signage successfully presented these species appropriately to the national and international Agribition visitors they attract.

KEY CONTACT Mark Allan, Canadian Western Agribition, (306) 565-0565.
E-mail: agribition@sk.sympatico.ca

TECHNICAL TITLE Agribition Specialized Livestock Marketplace

Refer to Project Number: 19970138 v.:1.3 w176

PROJECT FOCUS: Technologies to Tan Hair-On Hides Commercially

AFIF FUNDING

$62,000 approved. Project completion date: 4 February 1999.

OVERVIEW

AFIF funded the efforts of Amulet Western Heritage Products Ltd. to find/develop the technology to produce high-quality, tanned bison hides on a commercial scale.

Prior to the initiation of this project, there was no proper bison tanning facility in Western Canada. The existing fur tanneries could not accommodate hides as large and thick as bison. The end result was a product that was too thick, stiff and unevenly shaved to make quality bison robes or garments. Taxidermists were capable of producing a high-quality product, but the process was too labor-intensive and expensive for commercial production.

RESULTS ACHIEVED

The result of this project has been the establishment of a new tannery in Maple Creek that is producing bison hides rated among the best in North America. Bison producers now have a new market for the by-products of their animals. Not all hides are suitable for tanning, but producers who had previously been earning less than $10 per hide can now realize upwards of $200 per hide for at least some of their animals.

Amulet Western Heritage Products has developed both the technique and the technology for producing high-quality, light, thin, flexible and well-preserved bison hides. The process works equally well on most other mammalian hides (beaver and calf hides still present some difficulties). With some modifications, it is also capable of producing quality, white, hair-on buckskin.

KEY CONTACT

Jim Warren, Amulet Western Heritage Producers, (306) 662-4524.
E-mail: jkwarren@sk.sympatico.ca

TECHNICAL TITLE

Phase 2 Product Development Project: To Develop the Technologies to Tan Hair-On Hides at a Commercial Level

Refer to Project Number: 19970219 v.:1.2 w275

PROJECT FOCUS: Developing DNA Markers in Ranched Reindeer Herds

AFIF FUNDING $50,000 approved. Project Status: 15 October 2001.

OVERVIEW

Reindeer and caribou represent a significant resource for northern communities and the tourism industry. Now semi-domesticated in Scandinavia and Russia, they are being ranched in North America.

Although specific markets exist for fresh and process meats, antlers and skins, most revenues are still generated from the trade of breeding stocks. To strengthen the pedigree and avoid inbreeding, producers moved to develop DNA markers for use in pedigree and parentage identification in reindeer.

As well, recent local outbreaks of chronic wasting disease (CWD) and the threat of foot and mouth disease make identifying good genetic stocks imperative for herd maintenance and replacement.
Partners in the Project were Boa-Can Laboratories Inc. and the Saskatchewan Research Council (SRC).

RESULTS ACHIEVED

The research has fully characterized only three new reindeer microsatellite markers, somewhat short of the initial expectation to produce a panel of nine to 12 markers. Unexpected difficulties in cloning and isolation of reindeer microsatellite, and the limited number of useful reindeer markers developed in the study, resulted in a departure from the original methodology.

Research continues.

KEY CONTACT Connie Schmidt, Saskatchewan Reindeer Association, (306) 278-3373.
E-mail: info@schmidtoutdoors.com

TECHNICAL TITLE Development of Genetic Markers for Parentage Verification in Reindeer

PROJECT FOCUS: Developing Antibody Serums for Disease Diagnoses

AFIF FUNDING	$47,000 approved. Project completion date: 4 April 2000.
OVERVIEW	AFIF has funded a part of the efforts of the Centre for Animal Parasitology (CFIA) in Saskatoon to develop and commercialize antibody conjugates for specialized livestock including bison, fallow deer, mule deer, llama and alpacas. Blood tests can provide early and accurate diagnosis of parasite infections in livestock. ELISA (enzyme-linked immunosorbent assay) and Western blot are the standard tests used for this purpose, but they require antibody conjugates to act as indicators of the immune system response to the presence of parasites or infectious diseases. In order to be effective, the antibody conjugate needs to be specific to the animal being tested. Currently, the white-tailed deer is the only specialized livestock species that has an antibody conjugate available on the market. Antibody conjugates for other species (bison, fallow deer, mule deer, llama, alpacas, emu, ostriches) are unavailable.
RESULTS ACHIEVED	Through their efforts, researchers at the Centre for Animal Parasitology have produced antibody conjugates for bison, caribou and mule deer. Rapid diagnosis of infectious diseases in these species is now possible. Plans are under way to commercialize these new conjugates.
KEY CONTACT	Dr. Alvin Gajadjar, Centre for Animal Parasitology, (306) 975-5344. E-mail: agajadhar@em.agr.ca
TECHNICAL TITLE	Antibody Conjugates For Serological Diagnoses of Specialized Livestock

PROJECT FOCUS: Using DNA Technology in Bison Breeding

AFIF FUNDING

$43,000 approved. Project completion date: 16 May 2001.

OVERVIEW

Despite difficult times in Canadian agriculture, the alternative livestock industry, and bison in particular, is growing at a steady pace. Although specific markets exist for bison fresh and processed meats and leather goods, most revenues come from the sale of breeding stocks.

Pasture breeding, where large groups of bison cows are exposed to several bulls, appears to be the norm in the breeding business side of bison ranching. This typical breeding design leads to situation where the paternity - and sometimes even the maternity – of given bison calves are questionable. To meet the requirements of the Canadian Animal Pedigree Act and to avoid inbreeding, bison breeders saw the need to develop parentage verification testing for pedigree control.

Partners in the Project were Bova-Can Laboratories Inc. and the Saskatchewan Research Council.

RESULTS ACHIEVED

The Project involved implementing a testing system using DNA markers catalogued in a Bison DNA Library to determine bloodlines, and thus, parentage lines.

Using blood samples taken from bison, four bison micro-satellite DNA markers were deemed suitable for testing. The markers have a combined power of exclusion for the sire of approximately 0.905 making them useful for parentage control.

Following a request from the National Bison Registry (USA) and the Canadian Bison Breeder Association, another set of DNA markers had to be considered as part of routine testing for bison. Two sets of markers are now used as standard procedure.

KEY CONTACT

Leon Brin, Saskatchewan Bison Association, (306) 585-6304.
E-mail: saskbison@sk.sympatico.ca

TECHNICAL TITLE

Development of Genetic Markers for Parentage Verification in Bison

PROJECT FOCUS: Building a Database for Elk and Deer Diseases Study

AFIF FUNDING	$30,000 approved. Project completion date: 1 March 2002.
OVERVIEW	The Project involves information gathering, data analysis and publication of findings related to diseases affecting farmed wapiti and other deer species in Saskatchewan. The study's results should assist producers in controlling potential problems through improved management and reduced risk factors.
RESULTS ACHIEVED	Three main sources of information – laboratories, practitioners and farmers - are being used in the data gathering process. A database for elk and deer diseases has been established at the veterinary college in Saskatoon. It forms the nucleus of information that will assist veterinarians and producers in developing greater knowledge and insights into elk and deer diseases.
KEY CONTACT	Dr. Jerry Haigh, Western College of Veterinary Medicine, University of Saskatchewan, (306) 966-7171. E-mail: jerry.haigh@usask.ca
TECHNICAL TITLE	A Study of Causes of Mortality and Morbidity of Farm Wapiti and Deer

Refer to Project Number: 19980227 v.:1.1 w153

PROJECT FOCUS: Studying Antler Velvet as a Remedy for Healing

AFIF FUNDING	$25,000 approved. Project completion date: 31 March 2002.
OVERVIEW	The use of deer velvet antler has long been practiced in treatment of a variety of medical ailments and as a preventative medication in oriental cultures, particularly China and Korea. The Project is centred on evaluating the effects of two formulations of elk velvet antler – used in three different dosage levels – on the rate of wound healing in laboratory rats. The Project laboratory work is being conducted in accordance with the principles published in the Canadian Council on Animal Care "Guide to the Care and Use of Experimental Animals."
RESULTS ACHIEVED	Whatever the outcome of the Project, in terms of scientific results a scientific success will have been achieved. From an elk industry standpoint, a desired success will be demonstration of a positive effect of the antler velvet on healing rates of lab rats. Should positive results be realized, primary producers of elk would have the potential for a ready – and potentially enormous - market for products derived from velvet antler.
KEY CONTACT	Dr. Jerry Haigh, Western College of Veterinary Medicine, University of Saskatchewan. E-mail: jerry.haigh@usask.ca
TECHNICAL TITLE	A Study of the Effects of Canadian Antler Velvet (CVA) on Wound Healing

PROJECT FOCUS: Studying a New Generation Co-op Structure

AFIF FUNDING $16,000 approved. Project completion date: 14 December 1999.

OVERVIEW The AFIF funded Project was geared to a number of areas including:

- creation of infrastructure to make the wild boar meat market flourish and stabilize;
- establishment of federally-inspected slaughter facilities and development of markets for fresh cuts and value-added products;
- identification and exploitation of new markets and study of hunt-farm potential;
- worldwide promotion of wild boar products; and,
- co-ordination of emerging industries by setting production and grading standards, quality control and pricing mechanisms.

RESULTS ACHIEVED The membership of the Western Canadian Wild Boar Association advocates the creation of a marketing tool for their industry to increase returns to producers through higher margins in the processing and distribution of product. A survey of producers identified the New Generation Co-operative business structure as the preferred marketing vehicle.

This New Generation Co-op would have strategic alliances and co-operation with other industry stakeholders. Research has pointed to potential markets available.

Key to organizing the industry is co-ordination from within. Secondary consideration is stabilizing the market for wild boar products. Pooling of some resources to build slaughter and processing facilities must be considered by the industry.
In a co-operative arrangement alliance partners will share the returns of processing and marketing.

KEY CONTACT Rick McLennan, Western Canadian Wild Boar Association, (306) 773-2543.
E-mail: dmclenna@t2.net

TECHNICAL TITLE Western Canadian Wild Boar Association Orderly Marketing Project – Part II

PROJECT FOCUS: Education Programs for Horse Ranchers

AFIF FUNDING	$8,000 approved. Project completion date: 26 June 2001.
OVERVIEW	The Project centred on improving the knowledge and management of pregnant mare urine (PMU) operators in Southeast Saskatchewan through a series of educational modules presented by national and international equine professionals. All horse ranchers received invitations to the module presentations, as did veterinarians and 4-H leaders and members. Partner in the Project was the North American Equine Ranching Information Council (NAERIC).
RESULTS ACHIEVED	Included in the series of modules delivered were the following topics – Classroom sessions: Dental Care, Hoof Care, Reproduction, Nutrition, Conformation and Marketing. An artificial insemination demonstration of semen collection and insemination was also conducted.
KEY CONTACT	Heather McConnell, Saskatchewan Equine Ranching Association, (306) 453-2584. E-mail: upthecreekstables@sk.sympatico.ca
TECHNICAL TITLE	Equine Ranching Management Program

Refer to Project Number: 19970225 v.:1.2 w133

PROJECT FOCUS: Grazing Elk in Native Grass Pastures

AFIF FUNDING $5,000 approved. Project completion date: 15 November 2001.

OVERVIEW The Project's objective is to study using native grasses as rangeland for late-Summer grazing of Elk, instead of grazing them on cultivated forages developed for cattle.

RESULTS ACHIEVED A native grass prairie paddock was established in 1998. To date, a variety of species inventory data, plant biomass data, numbers of elk grazed and animal weight statistics have been collected.

Drought conditions retarded grass growth during some years and that has slowed data gathering. In some instances, supplemental feed was required, thereby compromising some of the results.

The study is continuing and results will be published once data is fully analyzed.

KEY CONTACT Clinton Jurke, Bar J Game Farm, (204) 288-4064.
E-mail: jurke@pangea.ca

TECHNICAL TITLE Economic and Environmental Viability of Elk Grazing on Native Pasture

PROJECT FOCUS: Reducing Mortality Rates in Farmed Elk Calves

AFIF FUNDING $5,000 approved. Project completion date: 30 October 2001.

OVERVIEW The Project is examining the cause of, and risks for, sickness and death in elk calves. By determining the major risk factors that predispose some calves to illness and/or death, it is anticipated that some of these risk factors will relate to management practices and that these practices can be changed to improve the elk calf survival rate.

RESULTS ACHIEVED A retrospective study of causes of death in farmed elk calves, submitted to the diagnostic laboratory at the Western College of Veterinary Medicine, has been completed.

A prospective study that attempted to associate certain management practices with different rates of illness and death was undertaken in the Spring and Summer of 1999. Levels of producer co-operation and calf mortality were both less than anticipated. Results to date are considered preliminary.

A Project extension has been requested.

KEY CONTACT Dr. Andy Allen, Western College of Veterinary Medicine, University of Saskatchewan, (306) 966-7294.
E-mail: andrew.allen@usask.ca

TECHNICAL TITLE Determination of Risk Factors for Perinatal Mortality in Farmed Elk

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194 Joint Use of Livestock Operations' Lagoons: Phase 1

PROJECT FOCUS: Working to Improve Rural Water Quality

AFIF FUNDING

$2,350,000 approved. Project completion date: 31 March 2002.

OVERVIEW

The Project is divided into four major components:

- surveying the agri-food sector and producers to determine water quality issues that pose the greatest impediments to rural development;
- piloting water quality treatment and enhancement systems for livestock, food and non-food processing, and household uses and consumption;
- water quality protection (protecting quality versus remediation) in terms of economic value, Best Management Practices; and, well and aquifer implications; and,
- education and technology transfer to targeted audiences and industry stakeholders.

RESULTS ACHIEVED

Using information from a broad agri-food sector survey, a number water quality issues have been identified generating action in a number of areas.

Pilot water treatment systems have been undertaken to test and demonstrate:

- low maintenance biological treatment systems for rural household, food and non-food processing, and livestock operations;
- membrane treatment systems for livestock water, greenhouse irrigation, rural pipelines, etc.;
- coagulation of dugouts and coagulation cells to enhance water quality supplies for livestock, crop spraying, processing and drinking;
- aeration systems for dugouts and small reservoirs;
- water well remediation; and,
- the economics of protecting water sources.

A number of research initiatives have been undertaken to provide information and technology transfer to individuals, groups, agencies and industry stakeholders.

KEY CONTACT

Darrell Corkal, Agriculture and Agr-Food Canada, (306) 975-6413.
E-mail: corkald@em.agr.ca

TECHNICAL TITLE

Rural Water Quality Program

Refer to Project Number: 19970159 v.:1.1 w241

PROJECT FOCUS: Improving Sustainable Forage Systems

AFIF FUNDING $1,150,000 approved. Project completion date: 20 June 2001.

OVERVIEW The Project's mandate was to extend management and improvement practices for sustainable forage resources and systems.

The Saskatchewan Stock Growers Association and the Extension Branch of Saskatchewan Agriculture and Food jointly undertook the project. Others taking part included representatives of the Grazing and Pasture Technology Program, Saskatchewan Forage Council and the Prairie Farm Rehabilitation Administration.

Anticipated results, in the form of current production information, for the main target group (ranchers and farmers) will include data that could:

- increase livestock production as a result of improved rangeland conditioning;
- reduce input costs as a result of adopting extended grazing season techniques;
- improve returns from marginal croplands; and,
- improve profitability, sustainability and global competitiveness.

RESULTS ACHIEVED Work on various components of the Project continues as planned.

Agrologists are using some of the preliminary research results in presentation and articles. Some of the research resides on the Forage-Rangeland Internet Site of Agri-Carta at http://www.agricarta.com/

KEY CONTACT Brian Weedon, Saskatchewan Stock Growers Association, (306) 773-9229
E-mail: gweedon@t2.net

TECHNICAL TITLE Sustainable Forage Systems

PROJECT FOCUS: Developing an Information Delivery Network

AFIF FUNDING

$1,055,000 approved. Project completion date: 13 September 1999.

OVERVIEW

The Project centred on setting up a direct link for information and extension programs delivery between producers and researchers. In essence this information network would assist producers in making more fully informed decisions in terms of sustainable land management practices.

AFIF supplied Project funding to the Saskatchewan Soil Conservation Association (SSCA).

The network involving researchers, industry stakeholders and producers also involves government extension services personnel, non-government producers' organizations, the Agriculture Development and Diversification (ADD) Board, producer-directed associations and Agriculture and Agri-Food Canada.

RESULTS ACHIEVED

The SSCA developed a producer information extension program involving researchers, industry and producers to promote information sharing and dialogue in a timely fashion. Key interest areas for the Project included:

- promoting reduced tillage systems;
- incorporating forages into annual rotations using low disturbance seeding (LDS) techniques;
- precision farming as it relates to conservation systems; and,
- developing carbon sequestration awareness and strategies for mitigating greenhouse gas (GHG) emissions.

KEY CONTACT

Glen Shaw, Agriculture and Agri-Food Canada, (306) 975-4773.
E-mail: shawga@em.agr.ca

TECHNICAL TITLE

Producer Directed Information Delivery

Refer to Project Number: 19970022 v.:1.1 w190

PROJECT FOCUS: Gathering and Sharing Beef Production Information

AFIF FUNDING $1,000,000 approved. Project completion date: 31 March 2002.

OVERVIEW The Project has four primary research areas:

- birth to slaughter information systems;
- economic sustainability for the beef industry at the organizational and regulatory research industry level;
- management of the forage chain through the effective management of grass, legume and/or annual crop production; and,
- beef production information systems and technology transfer.

RESULTS ACHIEVED

- Animal tracking systems are being developed to target key production stages in terms of animal health, breeding, performance, management and economic data. Animal identification methods (from birth to slaughter), including electronic ID, bar code tags, etc., are being evaluated.
- Two types of economic study are being undertaken – production economics and business management at the firm level, and, organizational and regulatory research at the industry level.
- In terms of forage chain management, a variety of experiments are under way involving grass species, legumes and annual crops. Areas being examined are the management; growth; harvesting by grazing or mechanical methods; storage; and, utilization by cattle.
- Gathering of beef production information and technology transfer work is centering on collection, storage, processing, distribution and utilization of data pertinent to the practical beef producer.

KEY CONTACT Gordon Stephenson, Western Beef Development Centre Inc., (306) 657-5801.
E-mail: gstephenson@wbdc.sk.ca

TECHNICAL TITLE Western Beef Development Centre

PROJECT FOCUS: Adaptation Through Informed Decision Making

AFIF FUNDING $1,000,000 approved. Project completion date: 27 December 2000.

OVERVIEW

Well-informed decision-making is a key component for successful adaptation to current economic and environmental pressures. The need to adopt alternative cropping systems is increasing. Introducing oilseed and pulse crop into rotations, periodic droughts, erosion and post harvest crop residues are but a few of the issue facing Saskatchewan producers.

The Project – a series of pilot projects - was aimed at assisting producers in adopting environmentally sustainable crop sequences and management practices for growing alternative crops in South-central Saskatchewan.

The Project also looked at refining information and decision-making tools that producers and professional can use to assess environmental effects and risks of growing alternative crops.

Partners in the Project included the Prairie Farm Rehabilitation Administration (PFRA), Saskatchewan Agriculture and Food, and the Saskatchewan Soil Conservation Association (SSCA).

RESULTS ACHIEVED

Awareness has been significantly increased about the requirements for making a transition to diversified cropping from conventional cropping. Soil suitability and climate maps have been compiled and distributed to agencies and groups within the pilot project areas.

KEY CONTACT

Larry Lenton, Agriculture and Agri-Food Canada, (306) 780-5153.
E-mail: lentonl@em.agr.ca

TECHNICAL TITLE Adaptation Through Informed Decision Making

PROJECT FOCUS: Chair for Environmentally Sustainable Agriculture

AFIF FUNDING $1,000,000 approved. Project Status: Endowment.

OVERVIEW The Project emphasizes three areas:

- Development of scientifically reliable procedures for evaluating the sustainability of farming in Saskatchewan;
- use of such procedures to evaluate the sustainability of farming systems; and,
- development of recommendations for improved land management and sustainability and communicate them to concerned individuals, groups and agencies.

RESULTS ACHIEVED A Chair was established to oversee the research project.

The Chair for 2000/2001, Dr. Andrew Schmitz, has obtained funding to study the growing trend toward cattle production in Saskatchewan. The Project, entitled *An Assessment of Western Canadian Beef Development*, is investigating and analyzing the implications of transforming cropland to livestock production from an economic, environmental and social perspective.

Articles have been written pertaining to climate change issues in agriculture from research work done by the Centre for the Studies in Agriculture, Law and the Environment (CSALE) staff, students and Fellows.

The *Climate Change in Agriculture Handbook* has been completed and distributed.

A number of key works in the area of greenhouse gas (GHG) emissions have been published and disseminated within the academic community.

A national network is being established to improve communication and collaboration among Canadian researchers working on climate changes issues, including GHG issues in agriculture.

KEY CONTACT Dr. Roger Cohen, University of Saskatchewan, (306) 966-4134.
E-mail: cohen@sask.usask.ca

TECHNICAL TITLE (Endowment) Chair for Environmentally Sustainable Agriculture in Saskatchewan

Refer to Project Number: 19960269 v.:1.2 w237

PROJECT FOCUS: Demonstrating Advantages of Precision Farming

AFIF FUNDING	$597,780 approved. Project completion date: 24 July 2000.
OVERVIEW	The Project's emphasis was on increasing the sustainability of farming operations through the development and extension of precision farming technologies designed for Saskatchewan conditions. Partners in the Project included: the Semi-arid Prairie Agriculture Research Centre (SPARC) Swift Current, Sk.; Canada-Saskatchewan Irrigation Diversification Centre (CSIDC) Outlook, Sk.; Saskatchewan Wheat Pool (SWP) Watrous, Sk.; and, Agriculture and Agri-Food Canada (AAFC) Melfort, Sk.
RESULTS ACHIEVED	During a three-year period, landscape-scale experiments were conducted at four sites with variable topography to examine the response of spring wheat to variable rate fertilizer (nitrogen and potassium) and seeding rate treatments. Response to the fertilizer inputs was limited in upper slopes positions due to moisture limitations. The greatest potential for increased yields occurred in lower slope positions, but these positions were also subject to yield losses due to adverse growing conditions including flooding, and weed and disease impacts. Through information distribution, field days, seminars and conferences, a variety of producer groups and industry stakeholders have received a clearer understanding of the potential for precision farming in this province.
KEY CONTACT	Dr. Dan Pennock, University of Saskatchewan, (306) 966-6852. E-mail: pennock@sask.usask.ca
TECHNICAL TITLE	Development and Extension of Precision Farming Systems Saskatchewan Producers

Refer to Project Number: 19960130 v.:1.2 w212

PROJECT FOCUS: Developing the Saskatchewan Land Resource Centre

AFIF FUNDING $570,000 approved. Project completion date: 8 February 2001.

OVERVIEW The Project's emphasis was in two areas:

- the establishment of a provincially recognized centre responsible for the collection, maintenance, research and distribution (sale) of spatially-related land information for the province; and,
- promotion of spatial soil information as a useful and necessary component of decision-making process relating to the management and conservation of soil and land resources.

Partners in the Project included the Department of Soil Science, University of Saskatchewan; and the Land Resource Unit, Semi-Arid Agricultural Research Centre (SAARC), Glenn Padbury, Section Head.

RESULTS ACHIEVED Using geographic information system (GIS) techniques, a comprehensive and consistent (seamless) map (1:100,000 scale) and related databases are available in digital form for all Saskatchewan lands to the northern limit of agriculture. Work continues on demonstrating its usefulness and making it internet-accessible.

Several subprojects have provided land information for a number of land use issues such as evaluating sites for intensive livestock operations, land constraints to harvesting straw for strawboard manufacture, capability of land for permanent cover for waterfowl habitat, guidelines for soil-applied herbicides, and, evaluations of crop insurance productivity.
As part of the communication effort, a number of seminars, workshops and training sessions on GIS have been completed.

KEY CONTACT Dr. Darwin Anderson, University of Saskatchewan, (306) 966-6827.
E-mail: andersd@duke.usask.ca

TECHNICAL TITLE Development of a Saskatchewan Land Resource Centre

PROJECT FOCUS: Integrated Management of Cropland Pests

AFIF FUNDING

$500,000 approved. Project completion date: 13 December 2000.

OVERVIEW

The purpose of the Project was to determine:

- the impact, efficacy and cost/benefit of various, integrated crop management systems on weed, insect and disease population levels;
- climate, predator, parasitoid and cropping characteristics that affect Bertha armyworm and Diamondback moth populations;
- genetic changes in grasshoppers using geographic information system (GIS) data to forecast populations; and,
- environmental and agronomic factors affecting wheat midge population levels.

Partners in this study were Agriculture and Agri-Food Canada (Matching Investment Initiative), the University of Saskatchewan, the University of Regina, and the Saskatchewan Wheat Pool.

RESULTS ACHIEVED

Experimental sites were set up at Saskatoon and Watrous, Sk., to study six integrated management systems that varied in tillage and herbicide intensity. The impact of these systems on weed populations, insect pests, disease incidence and economics were examined.

Unlike the Diamondback moth, where little difference was detected in larvae preferences, the Bertha armyworm showed substantial differences in feeding preference, growth, and development among the host plant varieties of canola and mustard tested.

Twenty-five years of historical grasshopper survey data were used to produce an eco-region map showing high-risk areas for grasshopper infestations. DNA analysis showed considerable genetic diversity within grasshopper populations but there was no correlation with density (risk).

Site-specific research analysis was compiled in a database for the Project's research components.

KEY CONTACT

Dr. A. Gordon Thomas, Agriculture and Agri-Food Canada, (306) 956-7270.

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TECHNICAL TITLE

Integrated Management of Cropland Pests

Refer to Project Number: 19960132 v.: 1.2 w256

PROJECT FOCUS: Promoting Diversification in the Agroforestry Sector

AFIF FUNDING

$480,000 approved. Project completion date: 9 November 1999.

OVERVIEW

The Project's objective was to provide information via extension services to owners and managers of woodlands in the province. Through increased communications with Farm Woodlot Association of Saskatchewan (FWAS) members, the Project emphasized the benefits of adopting environmentally and socially sustainable agroforestry practices.

AFIF also supplied $115,000 for a Research and Development subprogram of this Project. Objectives for this subprogram included assessing market opportunities for products; new product potential; benefit/costs analyses; and, grazing/forestry and crop/agroforestry interaction studies.

The FWAS client base is as diverse as is its clients' land bases. Clients' woodlands range from as small as five acres to large ranch lands exceeding 3,000 acres. Support for the main Project and Subproject came from Saskatchewan Agriculture and Food (SAF) and the Prairie Farm Rehabilitation Administration (PFRA).

RESULTS ACHIEVED

Information disseminated to members dealt with woodlot management, silviculture, value added issues, resource use, processing equipment, business planning, markets and products.

The Woodlot Walk-Thru service provides an assessment of the woodlot through on-site consultations with owners and/or managers. The service includes any required follow-ups and mail outs of additional information.

Networking, training, workshops and seminars, and information distribution is on-going.

KEY CONTACT

Nancy Lyle, FWAS, (306) 883-2204.
E-mail: fwas@sk.sympatico.ca

TECHNICAL TITLE

Provision of Extension Services to Agroforestry/Woodlot Managers

Refer to Project Number: 19960500 v.:1.2 w226

PROJECT FOCUS: Building a Special Crop Research Facility

AFIF FUNDING $350,000 approved. Project completion date: 31 October 2001.

OVERVIEW The Project was aimed at providing a permanent physical infrastructure for continuing the Special Crop Research and Demonstration Project at Redvers, Sk.

Partners in the Project include the Rural Municipality (RM) of Antler No. 61; the RM of Storthoaks No. 31; the Town of Redvers; Seed Hawk Manufacturing; and, many supporting Redvers' businesses.

RESULTS ACHIEVED This research site encompasses the building and equipment purchased with the Project funds.

The South East Prairie Rural Development Corporation (RDC) purchased 64.75 hectares (160 acres) of land for crop research purposes in areas of soil and climatic conditions.

KEY CONTACT Joan Raimbault, South East Prairie RDC, (306) 452-3588.
E-mail: seprdc@sk.symaptico.ca

TECHNICAL TITLE Special Crop Applied Research and Demonstration - Redvers

PROJECT FOCUS: Constructing a Research Centre at Canora

AFIF FUNDING

$330,000 approved. Project completion date: 25 October 2000.

OVERVIEW

The Project involved purchasing equipment to effectively conduct applied research at the Canora Spoke Site. A modern research and extension centre for clients was built, enabling clients to experiment, evaluate and learn about leading edge technology in specialty crop production specific to their particular climatic region of Saskatchewan.

Partners in the Project included District Nos. 12, 13 18 and 19 Agriculture Development and Diversification (ADD) Boards.

RESULTS ACHIEVED

Completion of the research centre allows for demonstration of new production practices and methods for increasing net revenues on specialty and traditional crops. It also allows for more regional adaptation and development of agronomy packages for specialty crops production in the East Central Region. Increased quality and crop yields are expected.

Greater awareness of the research centre has been generated through a broad communications effort using agriculture magazines, newspapers, newsletters, television appearances and producer meetings.

KEY CONTACT

Scott Anderson, East Central Research Foundation, (306) 563-5551.
E-mail: ecrf@sk.sympatico.ca

TECHNICAL TITLE

East Central Research Foundation Applied Research Centre

Refer to Project Number: 19970205 v.:1.1 w183

PROJECT FOCUS: Managing the Implications of Animal Manure

AFIF FUNDING

$304,000 approved. Project completion date: 20 June 2001.

OVERVIEW

The Project's intent was to improve the financial and environmental well being of existing and future intensive livestock operations (ILO) and manured lands.

Partners in the Project were the Prairie Agricultural Machinery Institute (PAMI) and Sask Pork.

RESULTS ACHIEVED

Through data obtained from field trials, greenhouse and laboratory studies, guidelines are being developed for best management practices to use animal manures as fertilizers.

A major finding of the study noted that when manure is applied at recommended rates that match the crop nutrient requirements over time, and injected to reduce volatile nutrient losses, economically good crops can be grown.

Liquid swine effluent's characteristics are more similar to commercial inorganic fertilizer than to cattle because its nutrients are readily available to the plant life. Solid cattle manures contain more nutrients in organic forms that are released more slowly over time.

More than 50 publications, and presentations have been made at scientific, industry and producer's conferences, workshops and field days. Two computer-based manure application recommendation systems have been developed.

KEY CONTACT

Dr. J. Schoenau, University of Saskatchewan, (306) 966-6844.
E-mail: schoenau@sask.usask.ca

TECHNICAL TITLE

Maximizing the Economic and Environmental Benefit of Land Application of Animal Manures

PROJECT FOCUS: Upgrading Beef Cattle Handling Facilities

AFIF FUNDING	$288,000 approved. Project completion date: 17 May 1999.
OVERVIEW	The Project keyed on upgrading facilities and buying equipment for the Termuende Farm and grazing lease at Pathlow Community Pasture.
RESULTS ACHIEVED	The corral system and cattle handling facilities were upgraded at the Termuende Research Farm operated by the Western Beef Development Centre Inc. (WBDC). Some old corrals were demolished; landscaping was completed; some corrals and sorting pens were rebuilt; feed bunks were added as needed; and, a new cattle processing building was erected. This upgraded facility allows for more efficient handling of cattle for research purposes. It provides the base of WBDC's activities as a co-ordinator of beef cattle information and technology transfer in Saskatchewan.
KEY CONTACT	Gordon Stephenson, Western Beef Development Centre, (306) 657-5801. E-mail: gstephenson@wbdc.sk.ca
TECHNICAL TITLE	Western Beef Development Centre's Research Centres

PROJECT FOCUS: Constructing Storage Space for Ag Equipment

AFIF FUNDING	$270,000 approved. Project completion date: 7 September 1999.
OVERVIEW	The Project involved construction of an equipment and storage building to expand research facilities for the Indian Head Agricultural Research Foundation (IHARF). Equipment storage space at the station was limited hampering IHARF's need for more commercial equipment. The research facility requested Project support to expand its capabilities for specialized crop research related to oats, canary seed, pulses and precision farming.
RESULTS ACHIEVED	The 15.2 metre x 24.4 metre building was constructed on renewable-leased land. It has increased IHARF's agronomic research capabilities and added to the long-term viability of its research programs.
KEY CONTACT	Yan Pelcat, IHARF, (306) 695-4200. E-mail: pelcaty@em.agr.ca
TECHNICAL TITLE	Expansion of Research and Technology Transfer Program

Refer to Project Number: 19970184 v.:1.2 w128

PROJECT FOCUS: Expanding the SWIFT Farm Research Facility

AFIF FUNDING

$250,000 approved. Project completion date: 16 April 2001.

OVERVIEW

The Project encompassed expansion of the SWIFT farm research facility to 64.75 hectares (160 acres) from the existing 16.19 hectares (40 acres). It also advocated funds for purchase of some new equipment for the farm, which uses field scale equipment that makes most of the field trial results more relevant to farmers' own operations.

RESULTS ACHIEVED

The larger land base allows more partners to take part in projects at the SWIFT farm and its satellites that allow for even more producers over a wider soil and climatic area.

The SWIFT spoke site is an integral component in research providing farmers with field scale projects that will ultimately encourage the adoption of specialized crops in an area where the potential for growth is great and the need for extending rotations involving these crops is equally great.

Part of the funds was used to construct a building to house new and existing equipment.

KEY CONTACT

Eric Oliver, Wheatland Conservation Area, (306) 778-7289.
E-mail: eoliver@agr.gov.sk.ca

TECHNICAL TITLE

Expansion of Special Crop Applied Research and Demonstration Projects for the Brown Soil Zone

PROJECT FOCUS: Demonstrating Precision Farming Technologies

AFIF FUNDING $232,000 approved. Project completion date: 1 February 2002.

OVERVIEW The Project's objectives included demonstrating the effectiveness of global positioning systems (GPS), geographic information systems (GIS), yield monitors and variable rate controllers as production tools. The intent is to provide producers with cost effective alternatives to extensive soil sampling and analysis.

There are a number of partners in this Project:

- Aventis
- Markusson New Holland
- Network Innovations
- Flexi-Coil Ltd.
- Royal Bank of Canada
- Simplot Canada Limited
- Zeneca Agro
- Westco
- Monsanto Canada Inc
- Pattison Liquid Systems
- Saskatchewan Agriculture and Food
- Ag Depot Millstreet
- Lonesome View
- Midwest Technologies Inc.
- OmniSTAR Inc.
- Agriculture and Agri-Food Canada

RESULTS ACHIEVED The Project is familiarizing producers with technologies applicable to crop monitoring such as remote sensing, soil salinity mapping, infra-red photographs, etc., by providing solid samples on a farm-scale basis.

Precision Farming (PF) allows the producer to vary one or more inputs across the field according to a pre-determined prescription as well as determine the variability in crop yields across the field or verify easily and accurately the impact of specific production technologies.

A Web site has been set up to share information about PF in general:
http://paridss.usask.ca/precisionfarm

KEY CONTACT Yan Pelcat, (306) 695-4200.
E-mail: pelcaty@em.agr.ca

TECHNICAL TITLE Determining Cost Effective Ways of Assisting Management Units within a Field for Precision Farming

Refer to Project Number: 19980132 v.:1.2 w222

PROJECT FOCUS: Getting Bugged About Noxious Weeds

AFIF FUNDING

$220,000 approved. Project completion date: 31 March 2002.

OVERVIEW

The Project involves using biocontrol agents in the form of insects to combat persistent, perennial weeds including scentless chamomile and leafy spurge. A secondary Project component involves the development and implementation of a provincial scentless chamomile awareness, education and control program.

Scentless chamomile, a white daisy-like flower, is prevalent along roadsides, railway lines and bodies of water.

Saskatchewan Agriculture and Food is a partner in the Project.

RESULTS ACHIEVED

Release sites dating back to the later 1980s are being monitored. The 1998 releases of the black spurge beetle are reducing leafy spurges stands in some locations. Insect populations are the variable in weed control.

Gall midges have been released in a number of locations to control scentless chamomile.

In all, 43 new release sites have been established while another 88 sites are still being monitored.

Noxious Weed Acts in neighboring jurisdictions are being studied with a view to recommending changes to Saskatchewan's statutes.

KEY CONTACT

Ken Engel, Saskatchewan Association of Rural Municipalities (SARM),
(306) 757-3577.
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TECHNICAL TITLE

Weed Control Initiative: Technology Adoption and Demonstration

Refer to Project Number: 19980158 v.:1.1 w194

PROJECT FOCUS: Expanding the Aquaculture Feeds Industry

AFIF FUNDING $200,000 approved. Project completion date: 31 August 2004.

OVERVIEW

The aquaculture feed industry represents only a fraction of the total feed use worldwide, but it is an attractive potential market for Saskatchewan feed ingredients because of the high value of aquafeeds and its position as the fastest growing segment of the feed industry.

The Project centres on three areas:

- development of a Saskatchewan aquaculture feed development program to meet the needs of feed producers;
- evaluation and development of new and alternative feedstuffs derived from existing Saskatchewan aquaculture feeds; and,
- development of infrastructure and personnel necessary to provide leadership within the industry on a sustained basis.

RESULTS ACHIEVED

The Project is progressing toward establishment of a component within the Prairie Aquaculture Research Centre (P.A.R.C.) that will provide leadership and support for Saskatchewan aquaculture feed producers. In addition, it will allow the development of new feed products domestically and internationally. At least three new feed products will be supported technically and commercialized through the Project.

An aquaculture nutrition education program at the Masters of Science degree level will eventually contribute to sustainability in the aquaculture feeds program.

KEY CONTACT

Vern Racz, Prairie Feed Resource Centre, (306) 966-5622.
E-mail: feedresources@sask.usask.ca

TECHNICAL TITLE Saskatchewan Derived Feedstuffs for Aquaculture

Refer to Project Number: 19990198 v.:1.2 w216

PROJECT FOCUS: Using High-Tech to Improve Farming Practices

AFIF FUNDING $198,000 approved. Project completion date: 9 November 1999.

OVERVIEW The Project had two objectives:

- to develop a Geographic Information Systems (GIS) infrastructure in partnership with the Prairie Farm Rehabilitation Administration (PFRA); and,
- to provide the agricultural community with basic GIS capabilities through an interactive "Internet Map Server".

RESULTS ACHIEVED GIS hardware and software was purchased and ArcView (software) training was conducted for Saskatchewan Soil Conservation Association (SSCA) staff.

GIS data are being developed and some SSCA-specific data have already been acquired.

PFRA has converted land cover data for use with the GIS.

A variety of map server software packages were assessed and evaluated. PFRA purchased Internet map server hardware and software, and have trained several staff. The software allows remote access to GIS data through the Internet that allows the user to query data and produce maps. PFRA has been developing pilot projects using an Intranet [Internal to Agriculture and Agri-Food Canada (AAFC)] Web site to gain experience. After testing, some agricultural mapping applications will be placed on an Internet site.

In terms of server hardware, the PFRA currently supports an Internet site (AAFC Online) and has a significant amount of land based data on network servers in the organization. The map server would provide access to information by building the appropriate links with these data and other data sources for producers, farm groups, agricultural communities, schools and universities, and non-governmental agencies.

KEY CONTACTS

Blair McClinton, SSCA, (306) 695-4235.
E-mail: ssca@sk.sympatico.ca

Bill Harron, PFRA GIS Unit, (306) 780-8149.
E-mail: harronb@em.agr.ca

TECHNICAL TITLE GIS Development to Support Adoption of Innovative Land Management Techniques and Precision Farming

PROJECT FOCUS: A Risk Assessment Tool for Soil Erosion

AFIF FUNDING	$152,000 approved. Project completion date: 19 November 1999.
OVERVIEW	Producers in the Brown and Dark Brown soil zones have rapidly adopted canola, mustard, pea, lentil and chickpea. But due to a lack of solid information, these producers may not have fully considered the erosion risk associated with these crops. This Project consisted of a two-pronged approach: • to determine the soil erosion risk associated with the production of pulse and oilseed crops in the Brown and Dark Brown soil zones; and, • to identify specific rotations and tillage practices that ensure erosion risk is reduced to levels compatible with the long-term maintenance of soil quality in the region.
RESULTS ACHIEVED	Research indicates these crops can be grown sustainably with acceptably low erosion risk, if subsequent tillage is carefully managed. Given the thousands of likely combinations of soils, topography, climate, tillage, crop sequences and yields, the Project's research data were formulated into an easy-to-use spreadsheet program. This valuable tool can calculate specific erosion risk and offer relevant options to producers to manage that risk.
KEY CONTACT	Brian McConkey, Agriculture and Agri-Food Canada, (306) 778-7281. E-mail: mcconkeyb@em.agr.ca
TECHNICAL TITLE	Environmentally Sustainable Production Practices for Diversified Cropping Systems

Refer to Project Number: 19960486 v.:1.2 w206

PROJECT FOCUS: Increasing Yields with Swine Manure Injection

AFIF FUNDING

$150,000 approved. Project completion date: 31 March 2002.

OVERVIEW

The rapid increase in Saskatchewan hog production has led to producer and public demand that swine manure be handled in an environmentally sustainable manner with the least possible odor.

The Project objectives include a number of demonstrations:

- low soil disturbance methods for injecting swine manure;
- crop response to manure injection at different application rates;
- crop response in canola under varying rates of and sulfur using low disturbance injection; and,
- odor reduction associated with manure injection.

RESULTS ACHIEVED

A number of sites in the province were selected for field trials. All sites were soil tested and swine manure treatments were applied with the number and type of treatments varied at each location. As expected, yield responses also varied by location.

Some commercial fertilizer was also used as a supplement in some of the trials. Monitoring of response to fertilizer injection continues. An economic analysis will be carried out at the end of the Project.

No combined detailed data analysis of all sites has been conducted (such analysis will occur in Winter 2001/2002), but results with wheat and durum show the potential to boost protein and grade with manure injection.

KEY CONTACT

Philip Leduc, Prairie Agricultural Machinery Institute (PAMI), (306) 682-5033.
E-mail: pleduc@pami.ca

TECHNICAL TITLE

Demonstration of Low Disturbance Injection of Swine Manure for Canola Production Effect of N/S Rates

PROJECT FOCUS: Community-based Watershed Management

AFIF FUNDING $145,000 approved. Project completion date: 27 December 2000.

OVERVIEW The Project's intent was to help the local community develop a better understanding of water quality through monitoring and assessment of water quality issues. Areas of research included development and implementation of locally accepted plans for remedying water quality issues.

The Big Shell Lake Watershed was used to demonstrate that community management of water quality is a viable approach in Saskatchewan.

Partners in the Project were the Big Shell Lake Watershed Stewardship Association, the Prairie Farm Rehabilitation Administration, Saskatchewan Water Corp., Saskatchewan Environment and Resource Management, Saskatchewan Agriculture and Food, and, the Canadian-Saskatchewan Agri-Food Innovation Fund.

RESULTS ACHIEVED Surface and groundwater quality monitoring was undertaken. Sources of nutrients and bacteria were identified, resulting in such remedial actions as:

- relocation of one cattle winter feeding site, water supply development, and construction of a retention pond for management of runoff;
- development of an alternate watering site for one cow/cal operation where animals previously watered directly from the lake;
- an awareness campaign about leaking sewage holding tanks;
- a study about using sedimentation ponds to remedy potential contamination from a cattle winter feeding site; and,
- a study entitled *Sewage Lagoon Effects on Groundwater Study* – Resort villages of Echo Bay and Big Shell began studying alternatives for managing sewage to eliminate groundwater contamination from active dumpsites.

Two Web sites were developed at http://www.agr.ca/pfra/water/bigshell.htm and http://bslwsa.icomm.ca/

KEY CONTACT Malcolm Black, Agriculture and Agri-Food Canada, (306) 970-5152.
E-mail: blackmw@em.agr.ca

TECHNICAL TITLE Community Watershed Management for the Maintenance or Improvement of Water Quality

Refer to Project Number: 19970163 v.:1.2 w266

PROJECT FOCUS: Using Swine Manure to Boost Forage Yields

AFIF FUNDING $130,000 approved. Project completion date: 22 May 2001.

OVERVIEW The Project's objective was to demonstrate the potential of using shallow injection of hog manure on grasslands in Saskatchewan.

Partners in the Project were the University of Saskatchewan Soil Science Unit, and the Saskatchewan Forage Council.

RESULTS ACHIEVED Results of this three-year Project show that low disturbance (of soil) injection of liquid swine manure in grasslands results in excellent forage yields, with no negative environmental effects.

All research sites were open for tours by interested parties during the Project's life cycle. Results have been presented at farm management and other industry-related meetings. Research data has also been included in a PAMI publication on effective manure utilization: *The Pork Producer's Guide to Managing Swine Manure in Saskatchewan.*

KEY CONTACT Gordon Hultgreen, Prairie Agricultural Machinery Institute (PAMI), (306) 682-5033.
E-mail: ghultgreen@pami.ca

TECHNICAL TITLE Shallow Injection of Liquid Hog Manure on Grassland

PROJECT FOCUS: Demonstrating Low Disturbance Seeding Techniques

AFIF FUNDING	$120,000 approved. Project completion date: 15 December 1999.
OVERVIEW	The Project was aimed at shortening the period between the development of new land management techniques by researchers and their subsequent adoption by producers.
RESULTS ACHIEVED	Using two plot seeders, the Saskatchewan Soil Conservation Association (SSCA) established an annual series of field demonstrations to systematically show new techniques associated with low disturbance seeding (LDS). The design characteristics of the plot seeders allow for comparisons between row spacings, openers and show the options available to producers with respect to crop diversity and rotations. The Project's Final Report is confidential.
KEY CONTACT	Blair McClinton, Saskatchewan Soil Conservation Association, (306) 695-4235. E-mail: mailto:mcclinton.ssca@ssca.usask.ca
TECHNICAL TITLE	New and Emerging Land Management Technique Demonstration Plot Seeders

Refer to Project Number: 19970200

PROJECT FOCUS: Transferring Technology to the Farm Field

AFIF FUNDING	$116,000 approved. Project completion date: 16 April 2001.
OVERVIEW	The Project's intent was to implement precision farm techniques and theory to farm-scale fields.
RESULTS ACHIEVED	Precision farming techniques and equipment were highlighted during 26 field days and private tours, reaching more than 1,200 producers, industry representatives and researchers. Equipment purchases included a field-scale air seeder and sprayer, both equipped with after-market automated and manual, variable rate, technology, as well as yield monitor and mapping unit, weather station and computer hardware and software for application of variable rate prescriptions through the use of global positioning systems (GPS). Prescriptions were developed and implemented to vary nitrogen and sulphur fertilizers based on soil tests and topography. Using GPS, problem weed areas in fields were identified and mapped. All fields and projects at the Conservation Learning Centre (CLC) were mapped for future reference.
KEY CONTACT	Ms. Laurie Hayes, CLC, (306) 953-2797. E-mail: lhayes@agr.gov.sk.ca
TECHNICAL TITLE	Conservation Learning Centre Precision Farming Initiative – Decision Support System Project

PROJECT FOCUS: Faster Growing Forage Production for Beef Cattle

AFIF FUNDING $115,000 approved. Project completion date: 15 June 2002.

OVERVIEW Increased cattle production has resulted in a need for more forage acreage to produce feed. Grass species that produce hay for a short period would provide crop producers with a cash crop.

The Project centres on forage production of fast-establishing forage grasses and how these are affected by soil zone, companion crop and legume associate.

RESULTS ACHIEVED Field trials were conducted at sites at Swift Current, Saskatoon and Nipawin in 1998, 1999 and 2000. Companion crops (pea, canola, perennial ryegrass and none) were the main plot, with grass species (intermediate wheatgrass, Dahurian wildrye and slender wheatgrass) in the subplot and legume mixtures (alfalfa) in the sub-subplot. Seedling plant count data were collected. Total biomass and/or seed yield data on the companion crops were also collected. The impact of the companion crop was determined by comparing forage yield in the year after seeding with the 'no companion' crop competition.

Data analysis indicates companion crops in Saskatchewan must be specific to each soil zone. In the Black soil zone (Nipawin) all three crops can be underseeded with perennial grasses without subsequent yield reduction. In the Dark Brown soil zone (Saskatoon) and Brown soil zone (Swift Current), perennial forage yield will be reduced up to 50% by companion crop competition.

Intermediate wheatgrass has the best potential for short-lived perennial forage stands based on establishment vigour and forage yield.

Alfalfa-grass mixtures will not always produce more forage than grass monocultures but will generally do so. The improved quality of alfalfa-grass mixtures relative to grass monoculture has been demonstrated in other studies.

KEY CONTACT Dr. Paul Jefferson, Agriculture and Agri-Food Canada, (306) 778-7252.
E-mail: jeffersonp@em.agr.ca

TECHNICAL TITLE Establishment of Short Rotation Forage Crops

Refer to Project Number: 19970385 v.:1.3 w298

PROJECT FOCUS: Combating Soil Erosion With Oil Industry Wastes

AFIF FUNDING $100,000 approved. Project completion date: 13 September 1999.

OVERVIEW As a possible solution for improving highly erodible sandy soils, the Project examined field trial data from a "soil oiling" technique that used waste oil sludge from the Consumers Co-operative Refineries Ltd. (CCRL) Heavy Oil Upgrader in Regina, Sask. The research dealt with developing a protocol for using such industrial waste and documented the benefits and potential concerns with its use.

Partners in the Project included the Canada-Saskatchewan Agri-Food Innovation Fund; Semiarid Prairie Agricultural Research Centre (SPARC); Agriculture and Agri-Food Canada; Department of Agricultural and Bioresource Engineering, University of Saskatchewan; Department of Soil Science, University of Saskatchewan; Ben Kambeitz, farmer at Richmound, Sk.; Research Centre, Imperial Oil Resources Ltd., and, CCRL.

RESULTS ACHIEVED Keying on highly erodible sandy soils, the effects of 'soil oiling' on enhancing soil structure and tilth were studied. The influence of agronomic practices (cropping, fertilization) on oil biodegradation and the conversion of soil to humus, and growth yield and quality of cereal crops in oiled soil were also studied.

In general terms, data from a single application of oily waste sludge on eroded, loamy sand were analyzed. Among the major findings were:

- the waste oil sludge "erosion proofed" the topsoil;
- soil microbial population increased greatly;
- oil-related nitrogen and phosphorous fertilization improves the efficiency of oil to humus bioconversion;
- yields of durum and oats after a year of fallow increased greatly, even without extra fertilization; and,
- soil oiling did not cause any pollution of groundwater with organics.

KEY CONTACT Keith Hanson, Agriculture and Agri-Food Canada, (306) 778-7267.
E-mail: hansonk@em.agr.ca

TECHNICAL TITLE Improvement of Erodible Soils Through Use of Oil Industry Wastes

PROJECT FOCUS: Demonstrating Swine Manure in Speciality Crops

AFIF FUNDING

$100,000 approved. Project completion date: 31 March 2002.

OVERVIEW

The demonstration Project at two sites is measuring agronomic responses of oil seeds and specialty crops to applications of hog manure in the Gray and Black soil zones of Saskatchewan.

Partners in the Project include: Agriculture and Agri-Food Canada and the University of Saskatchewan, Soil Science Unit.

RESULTS ACHIEVED

Baseline data from the soil sites at Loon Lake and near Melfort, Sk. will compliment and build upon data generated from a long term swine manure study in the Humboldt, Sk. area.

Initial visual monitoring of the sites shows favorable progress regarding in the manure's fertilization attributes.

Final Project results will be included in a detailed PAMI publication on manure utilization.

KEY CONTACT

Gordon Hultgreen, Prairie Agricultural Machinery Institute (PAMI), (306) 682-5033.
E-mail: ghultgreen@pamica

TECHNICAL TITLE

Demonstrating Opportunities for Hog Manure Fertilizer in the Gray and Black Soil Zone

PROJECT FOCUS: Controlling Weeds in the Dry Brown Soil Zone

AFIF FUNDING

$98,000 approved. Project completion date: 31 March 2002.

OVERVIEW

Direct seeding is becoming more popular with farmers in the Brown Soil Zone as more producers recognize the advantages of this farming practice over conventional methods. Research has shown the benefits of a diverse rotation and low disturbance direct seeding in increased yields, seed protein content, soil organic matter and erosion resistance.

Research elsewhere has also indicated that there can be a reduction in certain annual weed populations such as wild oats and wild millet. However, in the dry brown soils, particularly the light textured soils in the study region (Dry Brown Soil Zone), reduced weed populations have not been readily observed. The Project is aimed at:

- evaluating the effect of surface soil and seedbed disturbance from four single shoot disc openers on weed populations and crop establishment in the Dry Soil Zone;
- testing the agronomic performance of a diverse, extended rotation using different angle disc openers with varying levels of soil disturbance; and,
- testing the viability of zero-tillage direct seeding in dry brown soils.

RESULTS ACHIEVED

After two years of this study, some trends are emerging.

- the very low disturbance angle disc has shown significant advantages in both wet and dry years. Weed populations were significantly lower than with other openers;
- there was also a trend of a yield advantage with the disc opener for all; and,
- although the angle disc had the highest yields and lowest weed populations, the knife has shown a trend in 2000 of less weed density and higher yields over the spoon and sweep, the latter two of which had the highest weed density and lowest yield.

KEY CONTACT

Eric Oliver, Wheatland Conservation Area, (306) 778-7289.
E-mail: eoliver@agr.gov.sk.ca

TECHNICAL TITLE

Opener/Rotation Study: The Effect of Opener Disturbance and Crop Rotation on Weed Populations in the Dry Brown Soil

PROJECT FOCUS: Redirecting "Harvested" Water from Wet Fields

AFIF FUNDING

$88,00,000 approved. Project completion date: 13 September 1999.

OVERVIEW

This broad-based Project was mandated to evaluate, demonstrate and enhance research technologies that integrate agricultural and environmental sustainability by increasing cereal, alternative, and forage crop production across all segment of upslope, cultivated fields containing a wide range of soil regimes.

There was a consortium of 12 partners from agriculture, wildlife, wetlands, industry and engineering firms involved in the Project.

RESULTS ACHIEVED

The research consortium studied cost effective techniques for harvesting, conserving and utilizing atmospheric and soil water in upslope positions, and routing the excess to locations (in the same field) where the water could be used for:

- livestock and wildlife;
- irrigation of hayfields, pastures, vegetation cover over waterflow nesting sites; and/or;
- shelterbelt plantings that fix atmospheric carbon and provide shelter for wildlife.

Over the course of the Project, the consortium partners identified additional technology for research and development in order to widen the applicability of the water harvesting concept.

KEY CONTACT

Harold Steppuhn, Agriculture and Agri-Food Canada, (306) 778-7243.
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TECHNICAL TITLE

Harvesting and Utilizing Water in Wet Fields for Agro-Environmental Benefit

Refer to Project Number: 19960487 v.:1.2 w195

PROJECT FOCUS: Developing Precision Farming Techniques

AFIF FUNDING $80,000 approved. Project completion date: 31 March 2002.

OVERVIEW The Northeast Agricultural Research Foundation (NARF) is committed to promoting profitable farm operations by encouraging agriculture research and development in the Northeast region of the province.

The Project's aim is threefold:

- to determine the economic benefits of using yield monitors and Global Positioning Satellite (GPS) units on equipment and the variable rate applications of crop inputs;
- to develop guidelines for the recommended use of the variable rate application of fertilizer, fungicides and seeding rates on farms in Northeast Saskatchewan; and,
- to determine the training and support needs of producers required to make precision farming economically viable on farms.

RESULTS ACHIEVED Yield maps were obtained from participating producers and layered in geographic information systems (GIS). Some of the yield maps contained on-farm trials data while other were just mapped out. Among field trials, data were collected on variable seeding rates; fertility including micronutrients, fertility strips, canola varieties, fungicide application by weather stations disease modeling, and, satellite imagery.

A number of research/demonstration trials were also conducted.

KEY CONTACT Glenda Leach, Agriculture and Agri-Food Canada, (306) 752-2776 ext. 234.
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TECHNICAL TITLE Impact of Precision Farming on Economic Return from Crop Inputs

PROJECT FOCUS: Developing a Forage Investment Planning Tool

AFIF FUNDING $73,000 approved. Project completion date: 19 July 2001.

OVERVIEW

The Project's primary aim was to reduce risks associated with farm diversification into forages and livestock, thereby increasing producer confidence in adopting these new enterprises on their farm.

Partners in the Project included: The University of Saskatchewan, Grazing and Pasture Technology; Regional Livestock and Forage Specialists; Regional Farm Management Specialists, and the Extension Research Unit.

RESULTS ACHIEVED

A computer program was developed to allow producers to make direct comparisons of the economics of current crop rotation patterns against a change to forage rotations and livestock enterprises. The proposed land use changes take into consideration capital requirements, land characteristics and potential net income. The program allows producers to project rotations for up to eight years for some or all of their land parcels, so it is a useful tool for grain producers as well as those contemplating a change to increased forage and livestock production.

The program (loosely based on a spreadsheet application) utilizes default grain and forage budgets so initial results can be obtained quickly. If certain changes appear promising, the budgets and projections can be modified by the user to more accurately reflect the producer's exact cost and return structure.

This new tool should aid producers in calculating the benefits of greater forage production and promote more deliberate investment in livestock based operations. The software program, entitled the *Land Use Planner*, is available free of charge from any Saskatchewan Agriculture and Food Rural Service Centre.

KEY CONTACT Don Surminsky, Saskatchewan Agriculture and Food, (306) 786-1507.
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TECHNICAL TITLE Forage Investment Planner

PROJECT FOCUS: Continuing Education for Aerial Crop Sprayers

AFIF FUNDING

$70,000 approved. Project completion date: 10 May 2000.

OVERVIEW

The Project centred on development a Green Certificate curriculum and program targeted at upgrading the knowledge, skills and abilities of aerial applicators.

This competency-based program, included practical hands-on training for inexperienced aerial applicator personnel.

RESULTS ACHIEVED

Three distinct training courses were developed over the Project's term:

- Ground Crew/Loader Technician;
- Business Manager; and,
- Fixed Wing Pilots.

Seven students have been successfully accredited in the various course categories. Awareness materials have been distributed to attract more students. There is a strong indication the program and course materials have been welcomed by trainers, trainees and the industry in general.

Through provincial and national promotion, a successful relationship has been developed with Alberta Agriculture, Green Certification staff. This has brought about a mutual agreement whereby Alberta will franchise the training curriculum program from Saskatchewan Aerial Applicators Association (SAAA) and Saskatchewan Agriculture and Food.

As well, two television documentary programs related to aerial applicators and their use of the Green Certificate training curriculum have been completed and broadcast.

KEY CONTACT

Blair Mutcher, SAAA, (306) 767-7222.
E-mail: saaa@sk.sympatico.ca

TECHNICAL TITLE

Aerial Pesticide Applicator Green Certificate Program

PROJECT FOCUS: Diversifying Crops in Short Season Regions

AFIF FUNDING $64,000 approved. Project completion date: 31 March 2002.

OVERVIEW The Project will demonstrate and share information with producers on economically and sustainable, annual and perennial cropping systems in an area with a short, frost-free growing season.

Rabbit Lake in the RM #467 was chosen as the Project site. It has an average frost-free growing season of 87 days. In addition to climatic limitations of the site, farmers in the area are facing rail-line abandonment. Hence, these economic and climatic restraints provide challenges to local producers who are forced to change their farming systems to capture new market opportunities.

Project partners include Ducks Unlimited, the Saskatchewan Forage Council, and Saskatchewan Agriculture and Food.

RESULTS ACHIEVED The study is wide-ranging and has amassed data on the following (but not limited to) subject areas:

- economic comparison of high erucic acid rapeseed (HEAR) versus Polish and Argentine Canola varieties;
- testing of hulless barley;
- economics of grass seed production;
- economics of Timothy production for export markets;
- annual grain crops for silage;
- characteristics of winter wheat and fall rye; and,
- short season for pea variety tests.

KEY CONTACT Patricia Johnson, District No. 34 Agriculture Development and Diversification (ADD) Board, (306) 937-3447.

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TECHNICAL TITLE Thickwood Hills Short Season Agronomy Site

PROJECT FOCUS: Understanding Stream Bank Ecosystems

AFIF FUNDING

$61,000 approved. Project completion date: 30 November 1998.

OVERVIEW

Often called the "Green Zone", the Riparian Zone is the distinctively lush green ribbon between streams and uplands that is home to diverse communities of plants and animals. Both the stream bank and the flood plain make up the transition zone between water and uplands, which is called the riparian ecosystem. The uplands support drought tolerant plants whereas plants in riparian areas tend to love moisture and grow vigorously in response to the greater availability of moisture and nutrients.

Although occupying only a small area of the total land base, riparian areas influence watershed function and management of these areas have important economic and environmental consequences.

The Project's mandate was to assist landowners in developing and implementing riparian management plans on their land. It also presented case studies of riparian sites and a directory of those with expertise in the management of these zones. Partners in the Project were Wildlife Habitat Canada and the U.S. Federal Government.

RESULTS ACHIEVED

Creating more awareness of riparian land management was accomplished using a variety of communication vehicles including workshops, site tours and demonstrations, direct mail, editorial/media relations and meetings with stakeholders. In terms of printed materials, a planning guide was produced, as were six fact sheets (3,000 copies each).

The Project proponents expect long term benefits in such areas as:

- reliable supply of forages for livestock grazing;
- recharged groundwater reserves;
- improved wildlife habitat and healthy streams for fish; and,
- rural economic benefits through improved recreation, ecotourism and real estate values.

KEY CONTACT

Sharon Metz, Saskatchewan Wetland Conservation Group, (306) 787-4030.
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TECHNICAL TITLE

Riparian Stewardship Program

PROJECT FOCUS: Saskatchewan 4-H Movement on an "Ad" Venture

AFIF FUNDING $60,000 approved. Project completion date: 17 January 2001.

OVERVIEW

As funding for non-profit groups becomes scarcer and more competitive, non-profit groups must adapt and change their fund raising approach.

The Entrepreneurial Project launched by Saskatchewan 4-H was aimed at generating revenues through business ventures.

AFIF provided funding for the 4-H movement to seek entrepreneurial partnerships and projects to raise funds for the organization. This funding also acted as a catalyst for the organization to explore new methods and concepts for raising funds and awareness.

RESULTS ACHIEVED

Internal market research studies were undertaken of the 4-H community, its organization and assets. Analysis of the 4-H structure led the organization to identify its strengths and how they could be used for potential business ventures.

An Enterprise Team was established to work on two ventures:

- a Farm Safety coloring book to educate children on farm safety issues. Revenues are being generated through agricultural industry sponsors. A minimum 15,000-20,000 copies will be distributed once all sponsorships are sold.
- Sponsors are being sought for an Environmental Venture whereby 4-H prepares a landscaped area near a major Saskatchewan highway and generate revenue through selling advertising space on a small billboard.

Other such entrepreneurial ventures are planned dependent on the success of these first projects.

KEY CONTACT Ms. Bernadine Rudichuk, Saskatchewan 4-H Council, (306) 933-7348.
E-mail: brudichuk@agr.gov.sk.ca

TECHNICAL TITLE 4-H Entrepreneurial Project

Refer to Project Number: 19980365 v.:1.3 w238

PROJECT FOCUS: Reducing Odor from Swine Manure

AFIF FUNDING $60,000 approved. Project completion date: 28 March 2001

OVERVIEW The Project centred on the development and distribution of odor control information to Saskatchewan hog producers.

Partners in the Project were Saskatchewan Agriculture and Food (SAF) – Pork Central and Ag Operations Branch, and, the Prairie Agricultural Machinery Institute (PAMI).

RESULTS ACHIEVED A number of communications initiatives were undertaken, including:

- tours of swine operations to educate and inform members of the media, municipal councilors and regulators about the proactive steps pork producers take to manage swine manure;
- development of an on-line database on odors as part of the Environmental Issues Resource Centre – http://adminsrv.usask/psci
- development of short video production; and,
- production and distribution of 7,000 copies of *Odour Management Technology for Pig Production Facilities.*

KEY CONTACT Mr. Lee Whittington, Prairie Swine Centre Inc., (306) 373-9922.
E-mail: whittington@sask.usask.ca

TECHNICAL TITLE Reducing Odor from Manure

PROJECT FOCUS: The Swine Manure Management Manual

AFIF FUNDING

$60,000 approved. Project completion date: 19 December 2000.

OVERVIEW

Worldwide demand for pork continues to increase and there is ample room for Saskatchewan to increase hog production. The province is ideally suited to produce pork because of its abundant land use base to both produce feed for the animals and to utilize the manure to improve crop and forage production.

The Project's purpose was to produce a comprehensive, current and central source of manure management information for Saskatchewan hog producers.

RESULTS ACHIEVED

The *Manure Management Manual* was produced to provide a comprehensive source of farmer-friendly, environmentally sustainable information on swine manure management.

While it was in draft form, the manual was reviewed by outside experts. Prairie Agricultural Machinery Institute (PAMI) is promoting the manual – entitled *The Pork Producer's Guide to Manure Management in Saskatchewan* - through mail outs and industry meetings.

The PAMI manure manual includes the latest research results as well as industry developments and equipment information. Only research results from Saskatchewan projects and/or research that have been validated in this province were used in the manual for producers.

The manual describes different methods of storing and moving manure to the filed and also examines various application methods. Recent research indicates properly applied hog manure can bring in excellent yield response in both annual and forage crops.

KEY CONTACT

Gordon Hultgreen, (PAMI), (306) 682-5033.
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TECHNICAL TITLE

Manure Management for Saskatchewan Hog Producers

Refer to Project Number: 19960469 v.:1.1 w244

PROJECT FOCUS: Enhancing the Farm Smart 2000 Web Site

AFIF FUNDING $54,000 approved. Project completion date: 31 March 2002.

OVERVIEW The Project is studying risk associated with diversified farming by increasing support capability of the Farm Smart 2000 Internet site, which integrates production and economic information.

The site is located at http://paridss.usask.ca/farm_smart_2000/

RESULTS ACHIEVED A major initiative of the Project has been to establish stronger communications avenues such as Web pages, internet scripts for collaborators and database applications.

Studies have been conducted to find the required interrelationship among soil moisture, soil texture, soil organic matters and precipitation to build a crop yield model. Within the framework of Farm Smart 2000, a model has been built to predict crop yield.

More information has been put on the site dealing with support for precision and/or landscape farming including global positioning satellite (GPS) systems and geographic information systems (GIS). Additional software has been added for rangeland and manure management.

KEY CONTACT Murray Bentham, Agriculture and Agri-Food Canada, (306) 778-7216.
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TECHNICAL TITLE Supporting Saskatchewan Farmers' Decisions on Diversified Crop Production

Refer to Project Number: 19980165 v.:1.1 w178

PROJECT FOCUS: Forage Harvesting from Rural Road Allowances

AFIF FUNDING

$50,000 approved. Project completion date: 30 September 2001.

OVERVIEW

The Project centred on designing, developing and applying a machine for collecting forage material from municipal road allowances for a livestock feed source.

At present, much of the potential forage in the steep ditch slope of municipal roads is unrecoverable using commercially available equipment. The silage cut from the road allowances would be made available for the nearest local market (feedlot, pelleting plant, etc., based on current and long-term market availability).

RESULTS ACHIEVED

A consultant/designer has been hired to design a prototype machine that will, in effect, be a hybrid forage harvester/swather as a single unit able to cut steep sloped ditches. An accumulator wagon will also be purchased.

The Project's success will be measured by the acceptance of the prototype by industry, agriculture producers, governments and possible expansion of the technology/process.

KEY CONTACT

Tim Fox, Rural Municipality (RM) of Craik #222, (306) 734-2242.
E-mail: rm222@dig.craik.sk.ca

TECHNICAL TITLE

RM of Craik #222 Silage, Screening and Pelleting Program

Refer to Project Number: 19970429 v.:1.1 w176

PROJECT FOCUS: Using a Trace-Back System to Improve Beef Returns

AFIF FUNDING $50,000 approved. Project completion date: 31 March 2002.

OVERVIEW The Punnichy Beef Producers Club established a four-year rotational grazing program known as the Kutwood Forage Demonstration Farm. Using alfalfa as a main crop, production increased while costs were lowered.

AFIF is providing funding to expand the program to demonstrate:

- the advantages and practicality of a trace-back system to producer, feeders, packers and consumers; and,
- that such advantages can be shared by each segment of industry and therefore, the initial identification cost should be shared by the industry.

Saskatchewan Agriculture and Food, Ducks Unlimited, and the Prairie Farm Rehabilitation Administration (PFRA) are supplying some technical assistance.

RESULTS ACHIEVED The Project is working toward development of new technology to be used in a trace-back identification system that allows individual animals to be traced through the feedlot to the slaughter and packinghouse. Information from the tracing system could eventually be integrated into breeding program strategies.

So far, 60 calves are being electronically identified and monitored from birth through slaughter.

KEY CONTACT Ken Forden, Punnichy Beef Producers Club Inc., (306) 835-2645.
E-mail: fordk@sk.sympatico.ca

TECHNICAL TITLE Kutwood Forage Demonstration Farm and Identification Project

Refer to Project Number: 19970387 v.:1.1 w202

PROJECT FOCUS: Controlling Yellows Disease in Spice and Herb Crops

AFIF FUNDING

$50,000 approved. Project completion date: 22 December 2000.

OVERVIEW

Micro-organisms called phytoplasmas are the main cause for yellows disease in a wide range of native and cultivated plant species. The disease is transmitted by feeding leaf hopper insects and appears to be increasing on the Prairies in recent years.

The Project had four areas of research:

- compilation of a comprehensive review of issues surrounding aster yellows;
- monitoring of migration patterns of insect (leaf hoppers) disease carriers in Saskatchewan;
- establishment of plots of selected herbs and spices to test efficacy of selected organic insecticides under farm field conditions; and,
- monitoring of aster yellows disease in research plots.

RESULTS ACHIEVED

Project data analysis led researchers to conclude:

- sanitation is key;
- organic insecticides can help; and,
- host plants vary in susceptibility.

KEY CONTACT

Connie Kehler, Saskatchewan Herb and Spice Association, (306) 694-4622.
E-mail: g.musings@dlcwest.com

TECHNICAL TITLE

Aster Yellows Control for Organic Herbs and Spices

PROJECT FOCUS: Monitoring the Weather to Predict Potato Blight

AFIF FUNDING $50,000 approved. Project completion date: 31 March 2002.

OVERVIEW The Project is aimed at minimizing disease development in potatoes by linking fungicide applications to weather forecasts. The Project's thrust is fourfold:

- to add four new weather monitoring sites on Northeast seed potato growers' fields;
- to use the environmental data collected by the monitoring network to produce timely and more accurate disease prediction information;
- to make the disease prediction information available to seed potato producers in the region; and,
- to reduce the overall amount of fungicide used in the region, compared with a regular-timed spray program, while maintaining disease control in the field.

RESULTS ACHIEVED Data collected by the weather monitoring stations are sent via cellular phone to the central computer in Regina. A Vegetable Specialist with Saskatchewan Agriculture and Food processes the data and generates maps showing the potential for disease development in the region. Maps are updated weekly.

Data are available to producers through a toll free Late Blight Disease Line set up through the Saskatchewan Seed Potato Growers Association.

The Project has minimized disease development in fields. This resulted in opening new export markets - including the U.S., Mexico, Manitoba and Prince Edward Island - for Saskatchewan grown seed potatoes.

KEY CONTACT Karen Grayson, District No. 31 Agricultural Development and Diversification,

(306) 862-3380.
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TECHNICAL TITLE Weather Monitoring Systems for Disease Forecasting

PROJECT FOCUS: Extending Crop Rotations in Pulse Crops

AFIF FUNDING $48,000 approved. Project completion date: 31 March 2002.

OVERVIEW The Project encompasses four, broad areas:

- to increase the net farm income of Saskatchewan producers and improve their short and long term viability both economically and environmentally;
- to increase producers' knowledge and improve their decision making skills;
- to increase the adoption rate and acres of these sustainable and diversified cropping practices in Saskatchewan; and,
- to give extension organizations and private sector companies a demonstration venue to present Producers' Days.

There were partners in the Project: Saskatchewan Pulse Growers Association; University of Saskatchewan – Crop Development Centre; Saskatchewan Forage Council; Bert Vandenberg; Steve Shirtliffe; and, Saskatchewan Agriculture and Food.

RESULTS ACHIEVED The viability of growing edible beans in the thin Black Soil Zone has been demonstrated, as have extending the traditional four-year rotation of to six-to-seven years by including forages.

A 'Bean Club' of 10 producers has been formed with about 242.8 hectares (600 acres) of beans in production.

KEY CONTACT Larry Janzen, Seager Wheeler Farm Historical Site, (306) 232-5588.
E-mail: spruce.grove@sk.sympatico.ca

TECHNICAL TITLE Demonstrating Extended Crop Rotations (Using a Broad Spectrum of Cereal Broad Leaf – Oilseeds and Pulses – and Forage Crops)

Refer to Project Number: 19980142 v.:1.3 w203

PROJECT FOCUS: Sharing Information at Producers' Days

AFIF FUNDING $40,000 approved. Project completion date: 31 March 2002.

OVERVIEW The Project encompasses four, broad areas:

- to increase the net farm income of Saskatchewan producers and improve their short and long term viability both economically and environmentally;
- to increase producers' knowledge and improve their decision making skills;
- to increase the adoption rate and acres of these sustainable and diversified cropping practices in Saskatchewan; and,
- to give extension organizations and private sector companies a demonstration venue to present Producers' Days.

There were seven partners in the Project: Saskatchewan Soil Conservation Association; Saskatchewan Agriculture and Food; Ducks Unlimited; Monsanto; Zeneca Agro, Flexi-coil; and, the University of Saskatchewan Department of Horticulture.

RESULTS ACHIEVED The province's only Direct Seeding Day – Seeding Trends 2000 – was staged and drew more than 500 producers.

An Orchard Care Field Day was held drawing more than 80 producers, as was a producers' field day.

Seminars have been conducted in areas of Direct Seeding Do's & Don'ts, disease control, and forage.

A producer panel was held on integrating bison into traditional crop rotation systems using chaff.

KEY CONTACT Larry Janzen, Seager Wheeler Farm Historical Site, (306) 232-5588.
E-mail: spruce.grove@sk.sympatico.ca

TECHNICAL TITLE Seager Wheeler Farm and Diversified Farming System Program

PROJECT FOCUS: Retaining Ownership of Calves in the Feedlot

AFIF FUNDING

$38,000 approved. Project completion date: 31 March 2002.

OVERVIEW

The Project's main emphasis is to build interest in retained ownership of calves in the feedlot, and to increase knowledge of marketing, risk management and feeding calves.

RESULTS ACHIEVED

The Project involves 30 producers with each one placing 10 calves in a 300-lot pen at a local feedlot. Each producer pays the cost of feed, with the Project partnering with animal health care companies to provide any required drugs for the animals.

Calves will be put into the feedlot in October when they are at the 270-315 kilograms (600-700 pounds) weight level. They are being weighed every 60 days with results being discussed at extension meetings that also deal in information about marketing strategies, rations, supplements, herd health and risk management.

The Project is a learning experience, with each producer having a financial stake in the calves in the feedlot. By the last year of the four-year program, the producer will be assuming all costs and have a good working knowledge of what is involved in retaining ownership of the calves right up to slaughter.

KEY CONTACT

Cassandra Beutler, District No. 5 Agriculture Development and Diversification Board, (306) 532-4410.

E-mail: N/A

TECHNICAL TITLE

The Economics of Retained Ownership of Calves in a Feedlot

Refer to Project Number: 19970441 v.:1.2 w223

PROJECT FOCUS: Studying Beef Grazing Systems on Cowessess TLE

AFIF FUNDING $37,000 approved. Project completion date: 31 March 2002.

OVERVIEW The Cowessess First Nation Treaty Land Entitlement (TLE) Trust Committee has acquired tracts of land that are of marginal quality for grain production. The Committee established a partnership with Ducks Unlimited (Yorkton, Sk.) to set up a section of fenced, grazing land that would use a rotational grazing system design.

The Project's intent is to compare the cost of establishing a grazing system, with all the associated costs, and generate average dollars-per-acre returns in comparison with cropping the same area. An additional comparison will evaluate the dollars-per-acre return on grazing grasser cattle versus cow/calf operation, in terms of pounds of beef produced.

RESULTS ACHIEVED An exterior permanent fence was constructed around the 640 acres of land with electric cross fencing used to set up the rotational grazing within the perimeter. The system is sensitive to environmental conditions and benefits wildlife lands owned by the Cowessess Band.

Cattle are being weighed going in and coming out of the grazing area to measure weight gain on each land parcel. Summer grazing data is to be collected during the Project's three-year span.

KEY CONTACT Ryan Pewapisconias, Cowessess TLE, (306) 696-3121.
E-mail: cow.tle@sk.sympatico.ca

TECHNICAL TITLE Grazing Systems for Cowessess First Nation TLE Lands Rotational Grazing – Comparison Grasses Versus Cow/Calf

Refer to Project Number: 19980164 v.:1.2 w225

PROJECT FOCUS: Increasing Timothy Hay Forage for Export Markets

AFIF FUNDING

$35,000 approved. Project completion date: 28 August 2001.

OVERVIEW

Currently there are approximately 40,470 hectares (100,000 acres) of timothy hay grown on the Prairies for the compressed hay market, the bulk of which is sold to Japan.

Even with competitors for this export market like the United States and Australia, the Canadian Hay Association is predicting an increase in timothy production for compressed hay to 161,900 hectares (400,000 acres) in the near future.
The Project's main thrusts were to evaluate production of available varieties and develop management practices for crop establishment, fertilizer management and weed control.

RESULTS ACHIEVED

Trial sites were set up at Melfort, Carrot River and Star City in North Eastern Saskatchewan and Buchanan, Saltcoats and Canora in Eastern Saskatchewan. A number of observations were made, including:

- Goliath had the highest dry matter yield among the cultivars evaluated and also produced longer heads.
- on relatively weed-free fields, timothy established better when seeded without a companion crop. On weedy fields, timothy establishment was superior under companion crops such as canola or peas. Oats appears to be too competitive as a companion crop for timothy.
- although all trials were established on nutrient deficient soils, yield response was observed only for nitrogen fertilizer useage with application rates varying between locations.
- there was little injury when herbicides were sprayed on timothy seedlings, with the exception of Sundance, but spraying on established stands caused injury and reduced forage and seed yield.

KEY CONTACT

Rosalind Arndt, Agriculture Development and Diversification (ADD) Board No. 12, (306) 782-8886.

E-mail: arndn@sk.sympatico.ca

TECHNICAL TITLE

Specialized Forage (Timothy Hay) Systems in Agriculture Development and Diversification Board No. 12

PROJECT FOCUS: Predicting Climate Change Using Past Tree Rings

AFIF FUNDING

$35,000 approved. Project completion date: 13 September 1999.

OVERVIEW

The Project was aimed at extending the historical and geographic scope of climatic records, by reconstructing 500 years of annual climate from living and dead samples of coniferous trees within the Cypress Hills and nearby sites.

Data collected were used to get a better understanding of the impact of climatic changes on the sustainability and diversification of Saskatchewan agriculture.

Tree ring records ranged from 313 years (Cypress Hills) to 528 years (Sweetgrass Hills). In terms of climatic change and drought, the tree ring records offer a much longer perspective than more conventional instrumentation records that span only 115 years.

RESULTS ACHIEVED

Creating a 500-year climatic model was accomplished by sampling live and dead wood from the Cypress Hills of Southwestern Saskatchewan and Southeastern Alberta, as well as the Sweetgrass Hills and Bearspaw Mountains of Northcentral Montana.

Standardized tree ring width varies with annual and seasonal precipitation, and is most strongly correlated with August to July precipitation. Reconstructed precipitation data reveals the 18th and 19th centuries were characterized by more frequent and severe drought than the 20th century. Drought persisted for more than a decade during 1792-1804, 1855-68, and 1887-96. Such prolonged droughts were absent from the 20th century.

The climatic change data are being used as a basis for projecting climate conditions of the 21st century.

KEY CONTACT

Dr. David Sauchyn, Prairie Adaptation Research Collaborative, University of Regina, (306) 337-2299.
E-mail: sauchyn@uregina.ca

TECHNICAL TITLE

Climatic Variability and its Implications for Sustainable Agriculture

PROJECT FOCUS: Demonstrating New Technologies for Forage Crops

AFIF FUNDING $33,000 approved. Project completion date: 31 March 2002.

OVERVIEW Saskatchewan Conservation Learning Centre (SCLC) Inc. has operated a research and demonstration farm since 1993. Inherent to the SCLC's mission is the development and demonstration of diversified farming systems.

Diversification of farming systems and the use of associated technologies can be impeded when producers cannot identify how this new technology can apply and be integrated into their operation.

This Project involves data gathering through field-scale demonstrations on:

- reduced forage establishment costs;
- forages suitable to the Parkland area of Saskatchewan; and,
- direct seeding of forages.

RESULTS ACHIEVED New and proven varieties of grass and legume forages will encourage the inclusion of forage production in crop rotations and promote crop diversity. The Project is using a number of plots using direct seeding methods in wheat stubble. Standard haying practices will be employed. As the plots progress, producers will be able, through visual assessment, to address some of their concerns regarding these new technologies.

The effect of different cutting dates and fertilization are also being demonstrated. Information on the SCLC's Project is being disseminated via newsletters, media interviews, mail-outs and field day tours.

KEY CONTACT Ms. Laurie Hayes, SCLC Inc., (306) 953-2797.
E-mail: lhayes@agr.gov.sk.ca

TECHNICAL TITLE Establishment of Forages in a Direct Seeding System

PROJECT FOCUS: Management Intensive Grazing of Stocker Cattle

AFIF FUNDING

$33,000 approved. Project completion date: 31 March 2002.

OVERVIEW

The Project centres on operating a management-intensive grazing system under varying growing conditions in Saskatchewan. Using a planned grazing system, research was directed at the potential for increased stocking capacities, while evaluating performance levels of several forage varieties.

Partners in the Project included Ducks Unlimited Canada and the Saskatchewan Stock Growers Association's Grazing and Pasture Technology Program.

RESULTS ACHIEVED

The West 21 Forage Producers Association – a group of about 30 from the Unity, Macklin, Senlac and Neilburg, Sk., areas, undertook the Project.

A solar watering system was demonstrated for forage producers on a site using an electric fence to cross-fence the various forage types. Handling facilities were also constructed.

The Project allows producers to compare the potential of management intensive grazing systems with conventional grazing and/or grain production. Steers from different breed, calving dates and winter-feeding systems are also being compared in terms of their performance.

KEY CONTACT

Robert Cooper, West 21 Forage Producers Association, (306) 228-3181.
E-mail: N/A

TECHNICAL TITLE

Management Intensive Grazing of Stocker Cattle

PROJECT FOCUS: Creating Awareness of the Redvers Spoke Site

AFIF FUNDING	$30,000 approved. Project completion date: 2 January 2002.
OVERVIEW	The Project's emphasis is to ensure the industry in general and producers in particular, become aware of research and demonstration information. Partners in the Project include the Rural Municipality (RM) of Antler No. 61; RM of Storthoaks No. 31; the Town of Redvers; and, various industry and local supporters.
RESULTS ACHIEVED	Through much improved "Transfer of Knowledge" regarding crop research, producers have become much more informed and involved in the research project. Newsletters, news releases, and participation in trade shows and conferences have created a greater awareness of the research farm. Additional site signage has promoted more self-guided tours of the facility.
KEY CONTACT	Joan Raimbault, South East Prairie Rural Development Corporation (RDC), (306) 452-3588. E-mail: seprdc@sk.sympatico.ca
TECHNICAL TITLE	On-Going Operation of the Redvers Spoke Site

Refer to Project Number: 19990174 v.:1.2 w143

PROJECT FOCUS: Maintaining the Canora Spoke Site

AFIF FUNDING $30,000 approved. Project completion date: 2 January 2002.

OVERVIEW The Project has three objectives:

- to obtain the equipment to effectively conduct applied research at the Canora Spoke Site;
- to conduct a modern research and extension centre for producers and others in involved in the Project; and,
- to evaluate specialty crop production in the region's climate and soil zone.

Partners in the Project included District Nos. 12, 13, 18 and 19 Agricultural Development and Diversification (ADD) Boards.

RESULTS ACHIEVED Funding is directed at building upkeep, taxes, land rental, insurance fees, as well as all repairs and maintenance equipment purchases.

Other work is being done in areas of data analysis and any needed contractual work.

KEY CONTACT Rosalind Amdt, District No. 12 Agricultural Development and Diversification Board, (306) 782-8886.

E-mail: amdn@sk.sympatico.ca

TECHNICAL TITLE Canora Research Farm Operations

PROJECT FOCUS: R&D at the Conservation Learning Centre

AFIF FUNDING	$30,000 approved. Project completion date: 1 December 2001.
OVERVIEW	The Project's emphasis is to increase technology transfer of sustainable and diversified farming practices while promoting and extending knowledge of recent technologies that can be used by producers for farming in a more sustainable and competitive manner.
RESULTS ACHIEVED	More than 1,200 producers, industry representatives and researchers took part in 26 field days and tours. Approximately 50 articles, publications, media materials and interviews were completed and distributed. The Saskatchewan Conservation Learning Centre's (SCLC) was also represented at 60 conferences, trade shows, workshops and meetings. Through these extension activities, awareness has increased in the SCLC's programs. The SCLC demonstrates advances in technology in such a manner that the producer can compare results to his operation and evaluate the benefits if implementation.
KEY CONTACT	Ms. Laurie Hayes, SCLC, (306) 953-2797. lhayes@agr.gov.sk.ca
TECHNICAL TITLE	Conservation Learning Centre – Diversified Farming Systems Research and Demonstration

Refer to Project Number: 19970412 v.:1.2 w159

PROJECT FOCUS: Seeding Systems for Annual Legume Forage Crops

AFIF FUNDING $30,000 approved. Project completion date: 31 March 2002.

OVERVIEW With the decline in grain prices and increase in input and transportation costs, many producers are changing their current farming practices to maximize the value of their land base. Seeding grasses and forages to marginal land and diversifying into livestock is one step toward this goal.

The Project is based in two parts:

- determining the viability of incorporating an annual legume into a cropping system for grazing or hay production; and,
- testing the ability of alfalfa to establish itself in legume crop cover, thus providing the farmer with a forage crop in the year of establishment.

RESULTS ACHIEVED After three years of gathering data from field trials, it appears that a pea crop as an annual forage source is a viable choice for producers. It should be noted that silage pea produces much more biomass than other pea varieties, however, some protein is sacrificed. This tradeoff leaves producers with a decision that depends on the individual's feeding program. Results continue to be studied with work continuing on the seeding rates of mixes to give producers more "yield / protein" options.

KEY CONTACT Eric Oliver, Wheatland Conservation Area, (306) 778-7289.
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TECHNICAL TITLE Enhanced Direct Seeding Systems – Annual Legumes for Forage

Refer to Project Number: 19970395 v.:1.2 w223

PROJECT FOCUS: Planning for Droughts Using the Past

AFIF FUNDING

$31,000 approved. Project completion date: 9 November 1999.

OVERVIEW

The magnitude of drought's socio-economic devastation cannot be overstated. During the last major North American drought in 1988, more than $50-billion (US) was written off in drought-related losses. During that year, Western Canada drought-related losses exceeded $1.8-billion (Cdn), while continuing uncertainty in drought prediction contributes to crop insurance payouts of more than $175-million per year.

This three-year strategic Project - begun in late 1997 - was aimed at the establishment of scientific and mathematical techniques to predict the intensity, duration and frequency of droughts on the Canadian Prairies, thus protecting agricultural and crop insurance programs from collapse.

The Natural Sciences and Engineering Research Council of Canada (NSERC) provided additional funding.

RESULTS ACHIEVED

This project measured changes in prairie climate over the past 2000 years by studying the remains of microscopic plant-life – called diatoms - in lake mud. Like the study of tree-rings, analysis of diatom fossils in lake sediments allowed researchers to identify past droughts and form models to predict their return.

Overall, analyses showed that severe droughts are a natural feature of the Prairies and could occur in any year. Extreme droughts, like those of the 1930s, seem to occur every 60-100 years, with a 23-45% probability of occurring again by 2030 AD. Although past droughts have exhibited some cycles suggesting an influence of the sun, moon and ocean, most severe droughts are difficult to predict.

A critical Project finding was that the 20th century was relatively wet. By comparison, the devastating 1930s' droughts appear to have been some of the mildest events on record. In the past, the 'average' drought has lasted more than 10 years and could extend over 50 years in extreme cases. As well, because these "super droughts" appear without warning, their effects can be more devastating – no amount of after-the-fact planning will compensate the agricultural community. Instead, this Project concludes both that better models are needed to forecast drought occurrence and that long-term plans are required for farming communities to adapt to prolonged droughts.

KEY CONTACT

Dr. Peter Leavitt, University of Regina, (306) 585-4253.
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TECHNICAL TITLE

Planning for Droughts Using the Past

Refer to Project Number: 19960497 v.:1.2 w371

PROJECT FOCUS: Improving Soil and CO_2 Sequestration with Forages

AFIF FUNDING

$27,000 approved. Project completion date: 24 April 2001.

OVERVIEW

The Project involved two components:

- Investigation, development and promotion of economically and environmentally sustainable land use systems capable of storing more carbon in the form of plant, residue and soil carbon organic matter, thereby reducing atmospheric emissions of carbon dioxide (CO_2) and nitrous oxide (N_2O); and,
- Identification and monitoring of other factors that can affect carbon sequestration including plant type, size and depth of root mass, slope position, soil-climatic zone, land use and management.

Partners in the Project were Agriculture and Agri-Food Canada; Ducks Unlimited; and the Saskatchewan Stock Growers Association's Grazing and Pasture Technology Program.

RESULTS ACHIEVED

The study indicated that conversion of annually cultivated or disturbed land to forages has a positive impact on the quantity and quality of surface soil organic matter in the Black and Gray Soil Zones after five to 12 years.

It should be noted the study only looked at carbon differences in the top 15 centimetres of the soil profile.

KEY CONTACT

Dr. J. Schoenau, University of Saskatchewan, (306) 966-6844.
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TECHNICAL TITLE

Soil Improvement and Carbon Sequestration with Forages

Refer to Project Number: 19970398 v.:1.2 w200

PROJECT FOCUS: Studying Hybrid Poplar Plantations

AFIF FUNDING $24,000 approved. Project completion date: 27 December 2000.

OVERVIEW The research Project was broad-based encompassing a number of areas that included:

- developing block plantations of promising hybrid poplar clones for research and demonstration under Saskatchewan climatic conditions;
- selecting the best poplar clones that produce the greatest growth and yield in plantations;
- determining optimum spacings and culturing techniques for poplar hybrids;
- calculating the annual carbon accumulation in polar plantations;
- examining options for developing hybrid poplars as an alternative crop for landowners; and,
- evaluating the potential for large-scale hybrid poplar production for a pulpwood or oriented strand board (OSB) feedstock in co-operation with Saskatchewan's forest industries.

Partners in the Project were SaskPower, Millar Western Ltd., Weyerhaeuser Canada, and three private landowners.

RESULTS ACHIEVED Thirty-six hectares (90 acres) of hybrid poplars were established in six sites for evaluations, demonstrations and research. Preliminary growth and survival evaluations were done.

A number of agronomic issues were addressed including weed control alternatives.

KEY CONTACT John Kort, Agriculture and Agri-Food Canada, (306) 695-5130.

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TECHNICAL TITLE Hybrid Poplar Plantations as an Alternative Crop

PROJECT FOCUS: Soil Sampling for a Precision Farming System

AFIF FUNDING

$23,000 approved. Project completion date: 31 March 2002.

OVERVIEW

The Project is centred on finding a soil sampling system that would be economical to the producer to help solve the problem of variability in a field.

AFIF's funding will complement and add value to an on-going evaluation of precision farming in Northeastern Saskatchewan by the Northeast Agricultural Research Foundation (NARF).

Partners in the Project include Agriculture and Agri-Food Canada (AAFC) and Enviro-Test Labs.

RESULTS ACHIEVED

Three producers whose combines are mounted with global positioning satellite (GPS) units have been data gathering for two years. In hopes of dealing with the problems of variability, three different soil sampling techniques are being used:

- sampling by landscape;
- sampling on a set grid; and,
- sampling over a specific time period.

Each of the sampling systems will occur in the same field to get a comparison. Three to four fields will be studied, each with a different topography.

Through the use of the soil sampling, one of the producers working with NARF has been actively pursuing development of a cost-effective method to implement field-scale variable rate fertilization.

KEY CONTACT

Glenda Leach, AAFC, (306) 752-2776, ext. 234.
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TECHNICAL TITLE

Precision Farming – Northeast Agricultural Research Foundation

PROJECT FOCUS: Using Shelterbelts to Increase Crop Yields

AFIF FUNDING

$23,000 approved. Project completion date: 30 November 1998.

OVERVIEW

By sheltering vulnerable land from wind, shelterbelts reduce soil erosion, improve moisture conditions by trapping snow, and provide wildlife habitat. Crops yields can be significantly increased by the strategic placement of shelterbelts.

The Project was aimed at determining if producers who farm land protected by shelterbelts make different cropping choices than producers farming unsheltered land. It also looked at the type and amount of tillage practices regarding the sheltered and unsheltered farm lands.

RESULTS ACHIEVED

Data were collected via field reconnaissance on randomly selected quarter sections, with a follow-up mailed survey to farmers working sheltered and unsheltered lands. Data recorded dealt with the number and size of fields, crops grown and number and size of fields in summerfallow. In total, close to 900 quarter sections were inspected.

Despite the variability of the data, the crop diversity index values combined with producer comments, led to the conclusion the use of shelterbelts resulted in an increase in crop diversity.

KEY CONTACT

Judy McKell, Indian Head Agricultural Research Foundation, (306) 695-4250.
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TECHNICAL TITLE

The Effect of Shelterbelts on Cropping and Tillage Practices

Refer to Project Number: 19960488 v.:1.2 w200

PROJECT FOCUS: Developing A Safe Grazing System for Cattle

AFIF FUNDING	$20,000 approved. Project completion date: 14 December 2000.
OVERVIEW	The Project was aimed at improving the sustainability and profitability of beef enterprises by developing a system for safely grazing beef cattle on the perennial legume, low initial rate of digestion (LIRD) alfalfa. Data collected would be used to clarify the level of bloat resistance that LIRD alfalfa offers. By setting up a safe grazing regime, expectations would be for superior animal performance and elimination of bloat in cattle, thus improving profitability. Partners in the Project were Saskatchewan Agriculture and Food; Ducks Unlimited; and, Arndt Farms of Springside, Sask.
RESULTS ACHIEVED	A mix of 70% meadow brome grass and 30% AC Grazeland LIRD alfalfa proved to be the best method for incorporating LIRD alfalfa into a grazing system. The number of bloats was similar on the LIRD and the control alfalfa; neither was bloat free. However, the LIRD alfalfa appeared to slow the development of the bloat and/or the severity of it.
KEY CONTACT	Basil Fritz, Beaverdale Beef Producers Group, (306) 786-1509. E-mail: bfritz@agr.gov.sk.ca
TECHNICAL TITLE	Development of a Grazing Management System for Low Initial Rate of Digestion (LIRD) Alfalfa

PROJECT FOCUS: Carbon Accumulations in Agroforestry Plantations

AFIF FUNDING

$20,000 approved. Project completion date: 30 November 1998.

OVERVIEW

AFIF and SaskPower commissioned a study to determine the amount of carbon that can be retained by shelterbelts in the Brown, Dark Brown and Black Soil Zones in Saskatchewan. Carbon retained or sequestered in plant life helps to offset the carbon released into the atmosphere by industrial or natural processes. Determining the amount of sequestered carbon is an important step in calculating the carbon emission reductions necessary to achieve Canada's Kyoto Protocol commitments on greenhouse gases. This study looked exclusively at carbon sequestration in leaves and branches (the above-ground portion of a tree).

The study examined the following species: green ash, Manitoba maple, hybrid poplar, Siberian elm, white spruce, Scots pine, Colorado spruce, caragana, chokecherry, villosa lilac, buffaloberry and sea buckthorn. For purposes of comparison, the study compared 40-year-old trees because they were within the mature range of the expected lifespan of most species.

RESULTS ACHIEVED

In general, the study determined that, as trees grew and developed more leaf area, they were able to retain more carbon. In a tree's early year, its capacity to retain carbon is not very great due to its small leaf area. When a tree is old, size and disease slow its growth and its corresponding capacity to retain carbon. However, a tree in its prime increases its capacity to retain carbon as it increases in age and size.

The study determined that the rate of carbon sequestration varied not only among species but also among soil zones. In general, trees growing in the black soil zone grew faster than those in the Dark Brown and Brown Soil Zones, they may do very well if they are planted around farmyards or in locations with high water tables, where they can benefit from the longer growing season and milder winters common to this soil zone.

Caragana's carbon sequestration rate was considerably lower than those of any of the tree species, both on a kg/tree basis and a tonne/km basis.

KEY CONTACT

John Kort, Agriculture & AgriFood Canada, (306) 695-5130.
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TECHNICAL TITLE

Annual Carbon Accumulations in Agroforestry Plantations

Refer to Project Number: 19970123 v.:1.2 w361

PROJECT FOCUS: Examining Poplar Wood Quality and Land Suitability

AFIF FUNDING $19,000 approved. Project completion date: 30 November 1998.

OVERVIEW The Project centred on three areas:

- to provide information and technical data on the quality of using hybrid poplar "clones" in the province's forest products industry;
- to develop a land suitability rating system for poplar production in Saskatchewan; and,
- to determine the feasibility of hybrid poplar for pulpwood and/or oriented strand board (OSB) feedstock.

The Prairie Farm Rehabilitation Administration (PFRA) Indian Head Shelterbelt Centre undertook the study and was aided by the province's forest industry.

Because they thrive in harsh Prairie conditions, industry interest has increased in the hybrid poplars that comprise the majority of Prairie shelterbelts. As well, the industry's tree of choice - the aspen – is declining in numbers.

RESULTS ACHIEVED The research showed that "Walker" and "Assiniboine" poplar were more difficult to pulp - and yielded less pulp - than aspen. However, there is potential for poplar (specifically Walker) to become a source of wood fibre for Saskatchewan's pulp mills. Poplars grown in areas with plenty of moisture (400 mm or more of annual precipitation) were larger and produced more pulp.

Soil type, salinity, acidity and slope, as well as depth to the water table are some of the factors that will affect poplar production. The best locations for producing pulp-quality poplars are in the boreal transition eco-region (the parkland and forest regions).

KEY CONTACT Dr. William Schroeder, Agriculture and Agri-Food Canada (306) 695-5126.
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TECHNICAL TITLE Determination of Poplar Wood Quality and Land Suitability

PROJECT FOCUS: Examining Non-Traditional Crop Options

AFIF FUNDING

$11,000 approved. Project completion date: 24 April 2001.

OVERVIEW

The Project was intended to create an economic opportunity and seasonal employment by producing landscaping products specializing in hardy tree and shrubs suited to the Northern climate. In terms of diversifying Saskatchewan farming options, the Project piloted a tame blueberry plantation and examined other non-traditional crops.

Anne D'Lugos (306) 236-4720) was a partner in the Project.

RESULTS ACHIEVED

To assess the viability of commercial production, three test crops of Gingko, Echinacea and raspberries were planted. These crops survived two winters with varying results. 'Best Practices' were noted throughout the Project.

During various stages of crop development, several field tours were conducted for interested groups.

KEY CONTACT

Jo-Anne Dally, (306) 236-6835.
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TECHNICAL TITLE

Agroforestry Project that Combines Trees and Shrubs with Annual and Perennial Crops

Refer to Project Number: 19970133 v.:1.2 w143

PROJECT FOCUS: Joint Use of Livestock Operations' Lagoons: Phase 1

AFIF FUNDING

$6,000 approved. Project completion date: 11 November 1998.

OVERVIEW

The University of Saskatchewan received AFIF funding to study the feasibility of combining municipal effluent and liquid hog manure in an effluent lagoon system.

Generally, the most economical sewage treatment system for a small municipality is a lagoon storage/stabilization system with the treated wastewater being discharged into a permanent body of water on a bi-annual basis. Municipalities that lack a nearby water body have usually relied upon either effluent irrigation or mechanical treatment systems.

RESULTS ACHIEVED

If a municipality is planning to establish an effluent irrigation system and there is a nearby hog operation (existing or proposed) that uses effluent irrigation to dispose of its manure, there is a potential cost saving from combining the two systems.

While the actual amount of money saved would depend on the distance the effluent must be pumped and on the quantity of effluent, under optimal conditions, a combined municipal/agricultural irrigation system would require 20 per cent less land than two, independent irrigation systems.

For an average small community in Saskatchewan (500 to 2,000 people), the cost of pumping the sewage, constructing additional storage facilities and sharing the operational costs of the irrigation system may outweigh the benefits of a joint system. Irrigation is the only practical method of disposing of combined hog manure/wastewater. It cannot be treated and discharged into a nearby body of water because the manure will upset the ecological balance of the water body. It is not economical to truck the combined effluent to a field for injection because of the large volume of wastewater produced by a community.

Other considerations include odor problems; costs associated with separating solid and liquid hog manure; and the amount of land required to disperse nitrogen content.

KEY CONTACT

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TECHNICAL TITLE

Joint Use of Intensive Livestock Operations' (ILO) Lagoons: Phase 1

AGRI-FOOD
INNOVATION
FUND

Glossary

Canada

Saskatchewan

on a way
operations,
4 : to go
gin play
definite
29 as the extra day
learn
: to gain knowledge
or experience; also
CERTAIN — learn
learned \'lər-nəd\
adv
scholastic

AFIF PROJECT LISTINGS: Glossary of Terms

A

AAFC	Agriculture and Agri-Food Canada
ACARICIDE	Chemical agent (similar to insecticide) used to control mites in bee colonies
ADD	Agriculture Development and Diversification board
AEROBIC	A bacteria driven process that requires oxygen to function
AFIF	Canada-Saskatchewan Agri-Food Innovation Fund
AIMS	Agricultural Institute of Management in Saskatchewan
ANAEROBIC	A process that takes place in the absence of oxygen. Anaerobic bacteria thrive in an environment with little or no oxygen.

B

BIOGAS	A mixture of gases produced by anaerobic bacteria. The prominent gases are methane and carbon dioxide.

C

CARC	Canadian Agriculture Research Council
CARDS	Canadian Adaptation & Rural Development in Saskatchewan, an AAFC program used in evaluating project proposals and in client referrals.
CDC	Crop Development Centre at the University of Saskatchewan
CFS	Canadian Forest Service
CPDC	Crops Processing Development Centre (on PAMI site at Humboldt, Sask.)

Glossary of Terms, (continued)

CSALE	Centre for Studies in Agriculture, Law and the Environment
CSIDC	Canada-Saskatchewan Irrigation Diversification Centre, at Outlook, Sk.
CULTIVAR	botanical variety produced using cultivation
CVA	Canadian velvet antler

E

ECRF	East Central Research Foundation – Canora, Sk.
ELISA	enzyme-linked immunosorbent assay test
EMS	earthen manure storage – Structure built of soil and clay to store manure. Differs from a lagoon in that no treatment or change in the manure is expected or desired. Operation of an EMS also differs from the operation of a lagoon in that is completely emptied once or twice yearly.

F

FWAS	Farm Woodlot Association of Saskatchewan

G

GAPT	Grazing and Pasture Technology Program
GEMCo	Greenhouse Emissions Management Corporation
GHG	Greenhouse Gas emissions
GIS	geographic information systems
GLP	Good Laboratory Practices

Glossary of Terms, (continued)

H

HEAR	high erucic acid rapeseed
HRI	hotel, restaurant, institutional (sectors)

I

ILO	intensive livestock operation
IRAP	Industrial Research Assistance Program administered by the National Research Council (NRC)
IT	information technology

K

K	potassium

L

LAGOON	A structure built of soil and clay to store and treat manure anaerobically. Differs from EMS in that it is generally larger in volume and a given size of operation. Lagoon operation also differs from EMS in that it is no completely emptied, leaving sufficient treated manure volume to continue the anaerobic treatment process.
LDS	Low Disturbance Seeding systems
LIRD	Low Initial Rate of Digestion of the alfalfa perennial legume for beef cattle

M

MTAI	Managing Technology for Agricultural Information

Glossary of Terms, (continued)

N

N_2O	nitrous oxide, a byproduct of manure decomposition
NAERIC	North American Equine Ranching Information Council
NARF	Northeast Agriculture Research Foundation
NMR	Nuclear Magnetic Resonance laboratory
NRC	National Research Council
NSERC	Natural Sciences and Engineering Research Council of Canada

O

OSB	oriented strand board

P

P	phosphorus
PAMI	Prairie Agricultural Machinery Institute
PARC	Prairie Adaptation Research Co-operative
P.A.R.C.	Prairie Aquaculture Research Centre
pathogen	Microbial organism capable of causing disease. This may refer to a bacteria or a virus.
PBI	Plant Biotechnology Institute at the NRC
PDS	Prairie Diagnostic Services
PERMEABILITY	The ease of water movement through the soil. Coarse soils (sand) are generally more permeable than fine textured soils (clay).

Glossary of Terms, (continued)

PF	precision farming
PFRA	Prairie Farm Rehabilitation Administration
PFRC INC.	Prairie Feed Resource Centre Inc.
PLRV	Potato Leaf Roll Virus
PMU	pregnant mare urine

R

R&D	research and development
RDC	Rural Development Corporation

S

SAAC	Saskatchewan Agroforestry Advisory Council
SAARC	Semi-Arid Agricultural Research Centre, University of Saskatchewan
SABIC	Saskatchewan AgBiotech Information Centre
SAF	Saskatchewan Agriculture and Food
SAF ADF	Agriculture Development Fund
SAF AFEF	Agri-Food Equity Fund
SAF TAD	Technology, Adoption and Demonstration Fund
SBA	Saskatchewan Bison Association
SCDC	Saskatchewan Canola Development Commission
SCLC	Saskatchewan Conservation Learning Centre Inc.

Glossary of Terms, (continued)

SEBA	Saskatchewan Elk Breeders Association
SERM	Saskatchewan Environmental and Resource Management
SFC	Saskatchewan Forage Council
SFIDC	Saskatchewan Food Industry Development Centre
SFPA	Saskatchewan Food Processors Association
SLRC	Saskatchewan Land Resource Centre
SOCO	Saskatchewan Opportunities Corporation
SPARC	Semiarid Prairie Agricultural Research Centre
SPMC	Saskatchewan Property Management Corporation
SRC	Saskatchewan Research Council
SSCA	Saskatchewan Soil Conservation Association
SSGA	Saskatchewan Stock Growers Association
SSPGA	Saskatchewan Seed Potato Growers Association, Inc.
STEP	Saskatchewan Trade and Export Partnership
SWP	Saskatchewan Wheat Pool

T

TLE	Treaty Land Entitlement

Glossary of Terms, (continued)

V

VFA	volatile fatty acid. VFAs are an intermediate product on the digestion of organic material by anaerobic bacteria. Many of the odorous compounds found in manure at VFAs.
VIDO	Veterinary Infectious Disease Organization – an internationally recognized research institute whose mandate is to serve livestock and poultry producers and consumers by developing safe and effective animal health and performance products, preventive medicine programs and improved livestock management techniques and information.
VOLATILIZATION OF NITROGEN	A process (similar to evaporation) where aqueous ammonium nitrogen (NH_4^+) is released into the atmosphere in the form of ammonias gas (NH_3). Any volatile component can undergo volatilization.

W

WBDC	Western Beef Development Centre
WCVM	Western College of Veterinary Medicine at the University of Saskatchewan

Z

ZEM	zero erucic acid oriental mustard variety